ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2022 Rank Band : 201-250

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.

काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

website: www.kitsw.ac.in | E-mail: principal@kitsw.ac.in | : +91 9392055211, +91 7382564888

B.TECH. - COMPUTER SCIENCE & ENGINEERING (NETWORKS)
CSN

RULES & REGULATIONS FOR UNDERGRADUATE PROGRAMME
B.TECH. 4-YEAR DEGREE PROGRAMME (URR-18R22)

(Applicable from the Academic Year 2022 - 23)

Choice Based Credit System (CBCS)

SYLLABI (I to VIII Semesters)

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2022 Rank Band : 201-250

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Estd: 1980 KITSW
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• B.Tech. •

COMPUTER SCIENCE & ENGINEERING (NETWORKS) CSN

Rules & Regulations for undergraduate Programme
B.Tech. 4-Year Degree Programme (URR-18R22)

(Applicable from the Academic Year 2022-23)

SYLLABI (I to VIII SEMESTERS)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
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VISION OF THE INSTITUTE

- *To make our students technologically superior and ethically strong by providing quality education with the help of our dedicated faculty and staff and thus improve the quality of human life*

MISSION OF THE INSTITUTE

- *To provide latest technical knowledge, analytical and practical skills, managerial competence and interactive abilities to students, so that their employability is enhanced*
- *To provide a strong human resource base for catering to the changing needs of the Industry and Commerce*
- *To inculcate a sense of brotherhood and national integrity*

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (NETWORKS) - CSN

VISION OF THE DEPARTMENT

- *Attaining centre of excellence status in various fields of Computer Science and Engineering by offering worthful education, training and research to improve quality of software services for ever growing needs of the industry and society.*

MISSION OF THE DEPARTMENT

- *Practice qualitative approach and standards to provide students better understanding and profound knowledge in the fundamentals and concepts of computer science with its allied disciplines.*
- *Motivate students in continuous learning to enhance their technical, communicational, and managerial skills to make them competent and cope with the latest trends, technologies, and improvements in computer science to have a successful career with professional ethics.*
- *Involve students in analyze, design and experimenting with contemporary research problems in computer science to impact socio-economic, political and environmental aspects of the globe.*

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
UG - COMPUTER SCIENCE & ENGINEERING (NETWORKS) - CSN	
PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	***Within first few years after graduation, the COMPUTER SCIENCE AND ENGINEERING (NETWORKS)*** *graduates will be able to …*
PEO1: Technical Expertise	*Apply the fundamental knowledge of the core courses of computer science, Networks for developing the effective and Network Technology solutions.*
PEO2: Successful Career	*Excel in profession, higher education and entrepreneurship with updated technologies in software, computer networks and security based domains.*
PEO3: Soft Skills and Life Long Learning	*Exhibit professional ethics, effective communication and team work in solving engineering problems by adapting contemporary research towards sustainable development of society*

PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)	
UG - COMPUTER SCIENCE & ENGINEERING (NETWORKS) - CSN	
PROGRAM OUTCOMES (POs)	***At the time of graduation, the COMPUTER SCIENCE AND ENGINEERING (NETWORKS) graduates will be able to …***
PO1: Engineering knowledge	*apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems*
PO2: Problem analysis	*identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences*
PO3: Design development of solutions	*design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations*
PO4: Conduct investigations of complex problems	*use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions*
PO5: Modern tool usage	*create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations*

PO6: ***The engineer and society***	*apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice*
PO7: ***Environment and sustainability***	*understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development*
PO8: ***Ethics***	*apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice*
PO9: ***Individual and team work***	*function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings*
PO10: ***Communication***	*communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions*
PO11 ***Project management and finance***	*demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments*
PO12: ***Life-long learning***	*recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change*

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: ***Software Development and Quality assurance***	*Apply the fundamentals knowledge of computer science and engineering in developing the effective software for real world complex engineering problems adapting advanced technologies*
PSO2: Maintenance	*Design computer networks protocols and configure solutions for various network applications using contemporary hardware and software tools*
PSO3:Immediate professional practice	*Design computer networks protocols and configure solutions for various network applications using contemporary hardware and software tools*

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)
SCHEME OF INSTRUCTION & EVALUATION (*Applicable from B21 batch*)

URR-18R22

I-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

BRANCH : B.Tech. – ME / CSE / CSN / IT/ CSIoT (Stream – I) **[5Th+4P+2MC]**

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH101	Engineering Mathematics – I	3	1	-	4	10	30	40	60	100
2	ESC	U18CS102	Programming for Problem Solving using C	3	-	-	3	10	30	40	60	100
3	BSC	U18PH103	Engineering Physics	3	1	-	4	10	30	40	60	100
4	HSMC	U18MH104	Engineering for Communication	2	-	2	3	10	30	40	60	100
5	ESC	U18EE105	Basic Electrical Engineering	3	1	-	4	10	30	40	60	100
6	ESE	U18EE106	Basic Electrical Engineering Laboratory	-	-	2	1	40	-	40		100
7	ESC	U18CS107	Programming for Problem Solving using C Laboratory	-	-	2	1	40	-	40	60	100
8	BSC	U18PH108	Engineering Physics Laboratory	-	-	2	1	40	-	40	60	100
9	ESC	U18ME109	Workshop Practice	-	-	2	1	40	-	40	60	100
10	MC	U18EA110	EAA* : Sports / Yoga / NSS	-	-	2	-	100	-	100	-	100
11	MC	U18EA111	Universal Human Value-I (*Induction Programme*)	-	-	-	-	-	-	-	-	-
			Total:	14	3	12	22	310	150	460	480	1000

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] EAA: Extra Academic Activity * indicates mandatory non-credit course

Total Contact Periods/Week: 29 Total Credits: 22

Stream-I: ME, CSE, IT, CSN,CSE(IOT) Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION (*Applicable from B21 batch*)
II-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM
BRANCH : B.Tech. – ME / CSE / CSN / IT / CSIoT (Stream – I) **[5Th+2P+2MC]**

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH201	Engineering Mathematics – II	3	1	-	4	10	30	40	60	100
2	ESC	U18CS202R1	Data Structures through C	3	-	-	3	10	30	40	60	100
3	BSC	U18CH203	Engineering Chemistry	3	1	-	4	10	30	40	60	100
4	ESC	U18ME204	Engineering Drawing	2	-	4	4	10	30	40	60	100
5	ESC	U18CE205	Engineering Mechanics	3	1	-	4	10	30	40	60	100
6	ESC	U18CS207R1	Data Structures through C Laboratory	-	-	2	1	40	-	40	60	100
7	BSC	U18CH208	Engineering Chemistry Laboratory	_	_	2	1	40	-	40	60	100
8	MC	U18CH209	Environmental Studies*	2	_	-	-	10	30	40	60	100
9	MC	U18EA210	EAA* : Sports / Yoga / NSS*	-	-	2	-	100	-	100	-	100
Total:				16	3	10	21	240	180	420	480	900

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] EAA: Extra Academic Activity * indicates mandatory non-credit course

Total Contact Periods/Week: 29 Total Credits: 21
Stream-I: ME, CSE, IT, CSN,CSE(IOT) Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
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URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
III-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[7Th+2P+1MC]

S.No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics – III	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH302	Professional English	_	_	2	1	100	-	100	-	100
3	PCC	U18CN303	Object Oriented Programming through JAVA	3	1	-	4	10	30	40	60	100
4	PCC	U18CN304R22	Operating Systems	3	-	-	3	10	30	40	60	100
5	PCC	U18CN305	Computer Organization and Architecture	3	-	-	3	10	30	40	60	100
6	PCC	U18CN306	Advanced Data Structures	3	-	-	3	10	30	40	60	100
7	ESC	U18EI309	Digital Electronics	3	-	-	3	10	30	40	60	100
8	PCC	U18CN310	Object Oriented Programming through Java Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN311R22	Advanced Data Structures Laboratory	_	_	2	1	40	-	40	60	100
10	MC	U18MH315	Essence of Indian Traditional Knowledge	2		-	-	10	30	40	60	100
			Total:	20	2	6	23	250	210	460	540	1000

[L= Lecture, T = Tutorials, P = Practicals & C = Credits]
Total Contact Periods/Week : 28 **Total Credits: 23**

Stream-I: ME, CSE, IT, CSN, CSE(IOT) **Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
IV-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[6Th+3P+1MC]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60	100
2	HSMC	U18TP402	Soft and Inter Personal Skills	-	-	2	1	100	-	100	-	100
3	OE	U18OE403	Open Elective-I	3	-	-	3	10	30	40	60	100
4	PCC	U18CN404	Theory of Computation	3	-	-	3	10	30	40	60	100
5	PCC	U18CN405R22	Database Management Systems	3	-	-	3	10	30	40	60	100
6	PCC	U18CN406R22	Computer Networks	3	-	-	3	10	30	40	60	100
7	PCC	U18CN407R22	Database Management Systems Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN408R22	Computer Networks Laboratory	-	-	2	1	40	-	40	60	100
9	OE	U18OE411	Open Elective-I based Laboratory	_	_	2	1	40	-	40	60	100
			Total:	17	1	8	20	280	180	460	540	1000
11	MC	U18CH416	Environmental Studies*	2	_	_	_	10	30	40	60	100

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 26** **Total Credits: 20**

Open Elective-I:	Open Elective-II:	Open Elective-I based Lab:
U18OE403A: Object Oriented Programming (CSE) U18OE403B: Fluid Mechanics & Hydraulic Machines(CE) U18OE403C: Mechatronics (ME) U18OE403D: Web Programming (IT) U18OE403E: Microprocessors (ECE) U18OE403F: Strength of Materials (ME)	U18OE401A: Applicable Mathematics (MH) U18OE401B: Basic Electronics Engineering (ECE) U18OE401C: Elements of Mechanical Engineering (ME) U18OE401D: Measurements & Instrumentation (EIE) U18OE401E: Fundamentals of Computer Networks (CSE) U18OE401F: Renewable Energy Sources (EEE)	U18OE411A: Object Oriented Programming Laboratory (CSE) U18OE411B: Fluid Mechanics & Hydraulic Machines Laboratory (CE) U18OE411C: Mechatronics Laboratory (ME) U18OE411D: Web Programming Laboratory (IT) U18OE411E: Microprocessors Laboratory (ECE) U18OE411F: Strength of Materials Laboratory (CE)

Stream-I: ME, CSE, IT, CSN, CSE(IOT) **Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
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SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
V-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

URR-18R22

[6Th+3P+Seminar]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18TP501	Quantitative Aptitude & Logical Reasoning	2	-	-	1	10	30	40	60	100
2	PE	U18CN502	Professional Elective - I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18CN503R22	Advanced Computer Networks	3	1	-	4	10	30	40	60	100
4	PCC	U18CN504R22	Internet of Things	3	-	-	3	10	30	40	60	100
5	PCC	U18CN505	Compiler Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CN506R22	Machine Learning	3	-	-	3	10	30	40	60	100
7	PCC	U18CN507R22	Advanced Computer Networks Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN508R22	Internet of Things Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN509	Machine Learning with Python Programming Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CN510	Seminar	-	-	2	1	100	-	100	-	100
Total:				17	1	8	21	280	180	460	540	1000
***Additional Learning*:** *Maximum credits allowed for Honours / Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for students opted for Honours/Minor:				-	-	-	*21+7*	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] Total Contact Periods/Week : 26 Total Credits : 21

Professional Elective-I / MOOC-I:
U18CN502A: Artificial Intelligence
U18CN502B: Data Mining & Data Warehousing
U18CN502C: Digital Image Processing
U18CN502M: MOOCs course

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
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URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
VI-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[5Th+3P+1MC+Miniproject]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	MC	U18MH601	Universal Human Values-II	2	1	-	-	10	30	40	60	100
2	OE	U18OE602	Open Elective - III	3	-	-	3	10	30	40	60	100
3	PE	U18CN603	Professional Elective - II / MOOC-II	3	-	-	3	10	30	40	60	100
4	PCC	U18CN604R22	Software Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CN605	Cloud Computing	3	-	-	3	10	30	40	60	100
6	PCC	U18CN606R22	Cryptography and Network Security	3	-	-	3	10	30	40	60	100
7	PCC	U18CN607R22	Cryptography and Network Security Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18AI608	Cloud Computing Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN609R22	Advanced Java Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18AI610	Mini Project	-	-	2	1	100	-	100	-	100
			Total:	17	1	8	19	280	180	460	540	1000
Additional Learning: Maximum credits allowed for Honours/Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for** students opted for **Honours / Minor students:				-	-	-	*19+7*	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 26** **Total Credits: 19**

Open Elective- III:	Professional Elective-II / MOOC-II:
U18OE602A: Disaster Management	U18CN603A: Mobile Computing
U18OE602B: Project Management	U18CN603B: Wireless Sensor Networks
U18OE602C: Professional Ethics in Engineer	U18CN603C: Wireless Communication
U18OE602D: Rural Technology and Communication Development	U18CN603M: MOOCs Course

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
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URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
VII-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[4Th+2P+1MP-I+Internship]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18MH701	Management Economics and Accountancy	3	_	_	3	10	30	40	60	100
2	PE	U18CN702	Professional Elective - III / MOOC-III	3	-	-	3	10	30	40	60	100
3	PE	U18CN703	Professional Elective - IV / MOOC-IV	3	-	-	3	10	30	40	60	100
4	PCC	U18CN704R22	Design and Analysis of Algorithms	3	-	-	3	10	30	40	60	100
5	PCC	U18CN705R22	Design and Analysis of Algorithms Laboratory	-	-	2	1	40	-	40	60	100
6	PCC	U18CM706R22	CASE Tools Laboratory	-	-	2	1	40	-	40	60	100
7	PROJ	U18CN707	Major Project - Phase – I	-	-	6	3	100	-	100	-	100
8	MC	U18CN708	Internship Evaluation	-	-	2	-	-	-	-	-	-
Total:				12	_	12	17	220	120	340	360	700
Additional Learning*: *Maximum credits allowed for Honours/Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for students opted for Honours/Minor students:				**-**	**-**	**-**	***17*+7**	**-**	**-**	**-**	**-**	**-**

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits]

Total Contact Periods/Week: 24 **Total Credits: 17**

Professional Elective-III / MOOC-III:	Professional Elective-IV / MOOC-IV:
U18CN702A: Block Chain Technologies	U18CN703A: Ethical Hacking
U18CN702B: Storage Area Networks	U18CN703B: Big Data Analytics
U18CN702C: High Speed Networks	U18CN703C: Web and Database Security
U18CN702M: MOOCs course	U18CN703M: MOOCs course

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
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URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
VIII-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[3Th+1MP-II]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	PE	U18CN801	Professional Elective - V / MOOC-V	3	-	-	3	10	30	40	60	100
2	PE	U18CN802	Professional Elective - VI / MOOC-VI	3	-	-	3	10	30	40	60	100
3	OE	U18OE803	Open Elective - IV / MOOC-VII	3	-	-	3	10	30	40	60	100
4	PROJ	U18CN804	Major Project - Phase – II	-	-	14	7	60	-	60	40	100
5	PCC	U18CN805R22	Mobile Application Development Laboratory	-	-	-	-	-	-	-	-	-
			Total	9	-	14	16	90	90	180	220	400
Additional Learning*: *Maximum credits allowed for Honours/Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for students opted for Honours/Minor students:				-	-	-	*16+7*	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 23** **Total Credits: 16**

Professional Elective-V / MOOC-V:	Professional Elective-VI/ MOOC-VI:	Open Elective-IV/MOOC-VII:
U18CN801A: Software Defined Networking U18CN801B: Cyber Security and Digital Forensic U18CN801C: Advanced Real World Data Networks U18CN801M: MOOCs course	U18CN802A: Network Automation U18CN802B: Data Science U18CN802C: Fog and Edge Computing U18CN802M: MOOCs course	U18OE803A: Operations Research U18OE803B: Management Information Systems U18OE803C: Entrepreneurship Development U18OE803D: Forex &Foreign Trade U18OE803M: MOOCs Course

***Note: An Android course with at least 2 weeks duration must be done by students and should submit course completion certificate**

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2020 Rank Band: 201-250

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत
కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము
Estd-1980 KITSW
(An Autonomous Institute under Kakatiya University, Warangal)
(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)
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RULES AND REGULATIONS FOR UNDERGRADUATE PROGRAMME
B.TECH 4-YEAR DEGREE PROGRAMME (URR-18)
CHOICE BASED CREDIT SYSTEM (CBCS)
(Applicable from the academic year 2018-19)

1. INTRODUCTION

1.1 Kakatiya Institute of Technology & Science, Warangal (KITSW) is a UGC autonomous institute under Kakatiya University (KU) Warangal. The institute offers 4 year (8 semesters) Bachelor of Technology (B.Tech) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year (A.Y) 2018-19.

1.2 The provisions contained in these regulations given the conditions for imparting course of instructions, conducting examinations and evaluation of students' performance leading to B.Tech. 4-year degree programme to be offered by the Kakatiya Institute of Technology & Science, Warangal and awarded by Kakatiya University, Warangal.

1.3 These regulations shall be called the ***Kakatiya Institute of Technology & Science, Warangal (KITSW) regulations for the award of B.Tech 4-year degree programme*** *by Kakatiya University, Warangal.*

1.4 They shall come into effect from the date of getting approval from the Academic Council of the Kakatiya Institute of Technology & Science, Warangal

1.5 They shall be applicable for all students enrolling for B.Tech 4-year degree programme at the Kakatiya Institute of Technology & Science, Warangal from the academic year 2018-19.

2. DEFINITIONS

2.1 ***"B.Tech."*** means Bachelor of Technology, an Under Graduate Degree awarded from the Kakatiya University, Warangal

2.2 ***"University"*** means Kakatiya University, Warangal

2.3 ***"Institute"*** means Kakatiya Institute of Technology & Science, Warangal

2.4 ***"UGC"*** means University Grants Commission, New Delhi

2.5 ***"AICTE"*** means All India Council for Technical Education, New Delhi

2.6 ***"MHRD"*** means Ministry of Human Resource & Development, Govt. of India, New Delhi

2.7 ***"TSCHE"*** means Telangana State Council for Higher Education, Govt. of Telangana, Hyderabad

2.8 ***"GB"*** means Governing Body of the Institute

2.9 ***"AC"*** means Administrative Committee of the Institute

2.10 ***"FC"*** means Finance Committee of the Institute

2.11 ***"Academic Council"*** means Academic Council of the Institute

2.12 ***"Principal"*** means Principal of the Institute

2.13 ***"Dean"*** means Dean of specific affairs of the Institute

2.14 ***"HoD"*** means Head of the Department of specific programme offered by the Institute

2.15 ***"BoS"*** means Board of Studies in the engineering of a specific programme offered by the Institute

2.16 ***"CoE"*** means Controller of Examinations of the Institute.

3. UNDER GRADUATE PROGRAMMES

3.1 The Institute shall offer the following Under Graduate Programmes under CBCS:

1. B.Tech Civil Engineering (CE)
2. B.Tech Mechanical Engineering (ME)
3. B.Tech Electronics & Instrumentation Engineering (EIE)
4. B.Tech Electrical & Electronics Engineering (EEE)
5. B.Tech Computer Science & Engineering (CSE)

6. B.Tech Information Technology (IT)
7. B.Tech Electronics & Communication Engineering (ECE)
8. B.Tech Computer Science & Engineering (Networks) (CSN)
9. B.Tech Electronics Communication & Instrumentation Engineering (ECI)
10. B.Tech Computer Science & Engineering (Artificial Intelligence & Machine Learning)
11. B.Tech Computer Science & Engineering (IoT)

3.2 The provisions of these regulations shall also be applicable to any new undergraduate programmes that are introduced from time to time with approval from appropriate bodies such as MHRD / AICTE / UGC, etc.

4. ADMISSION

4.1 a) Candidates seeking admission to 1st year of the Four Year B.Tech. degree programme shall have passed the Intermediate Examination of the Board of Intermediate Education, Telangana with Mathematics and Physical Sciences (Physics and Chemistry) as optional subjects or any other examination recognized by the University as equivalent to it.

b) **Lateral Entry:** Candidates seeking admission directly into 2nd year of 4-year B.Tech. degree programme as **"Lateral Entry"** student shall have passed 3 year full time Diploma (after 10th Std) offered by State Board of Technical Education and Training, Telangana or any other examination recognized by the University as its equivalent.

4.2 The Admissions shall be made in accordance with the guidelines issued by TSCHE.

4.3 **Change of Branch:** There is a provision for change of branch in B.Tech. III semester level only in accordance with guidelines provided by Commissioner of Technical Education, Govt. of Telangana State. Branch change shall be strictly according to the merit list prepared by the Institute from the regular students on the basis of total marks obtained by the student in I and II semester examinations put together. Only those students who have passed in all the subjects in single attempt shall be eligible to apply for change in branch, provided there is a clear vacancy in a particular branch limited to prescribed / approved intake by AICTE in the previous academic session when the students were admitted at I semester level.

Vacancy in a particular branch

= Approved intake – (No. of regular students + No. of repeaters)

5. ACADEMIC SESSION

5.1 Each academic session is divided into two semesters (odd and even), each of 16 weeks including two Mid Semester Examinations (MSE).

a) **Odd Semester**: From June/July to October/November of academic year. However, academic session of the first semester will be decided based on counseling schedule declared by the TSCHE.

b) **Even Semester**: From November/December to March/April of academic year.

5.2 The Institute shall announce the schedule for all the academic activities well before the commencement of the academic year and take all the necessary steps to follow them scrupulously.

5.3 The academic activities in a semester normally include registration, course work, Continuous Internal Evaluation (CIE), End Semester Examination (ESE) and declaration of results.

6. REGISTRATION

6.1 All the students are required to register in person at the beginning of each academic year on the dates specified in the academic calendar (almanac).

6.2 The sole responsibility for registration rests with the student concerned.

6.3 Registration of students will be centrally organized by the Academic section.

6.4 The Registration procedure involves:

a) Filling of the prescribed registration form

b) Payment of fees and clearance of outstanding dues (if any)

c) Signing undertakings (undertaking for regular attendance, discipline and against ragging) along with the parents

6.5 If for any compelling reasons like illness, etc., a student is unable to register on the announced day of registration, he/she can register within 12 working days from the beginning of the academic year on payment of an additional late fee as prescribed by the Institute.

6.6 **No late registration shall be permitted after 12th working day** from the scheduled date of commencement of class work for that academic year.

6.7 Only those students will be permitted to register who have

a) cleared all institute and hostel dues of previous semesters
b) paid all required prescribed fees for the current academic year
c) not been debarred / detained from registering for a specified period on disciplinary or any other grounds
d) cleared the minimum academic requirement as detailed in Regulation No. 15

7. CURRICULUM

7.1 The Model curriculum/ Course structure as suggested by AICTE, New Delhi; CBCS and Credit Based Semester System (CBSS) as denoted by UGC, New Delhi is followed for all UG programmes.

7.2 a) The duration of the programme leading to B.Tech degree will be 8 semesters (4 academic years)
b) However, for the lateral entry students, the duration of the program leading to B.Tech degree will be 6 semesters (3 academic years)

7.3 The curricula for different degree programmes as proposed by the department and recommended by the BoS shall have the approval of the Academic Council.

7.4 As suggested by AICTE, the courses offered for UG programme are broadly classified as: Basic Science Courses (BSC), Engineering Science Courses (ESC), Humanities and Social Sciences including Management Courses (HSMC), Professional Core Courses (PCC), Professional Elective (PE) courses, Open Elective (OE) courses, MandatoryCourses (MC) and Project (PROJ) based courses

7.5 The courses offered would have a ***Lecture – Tutorial – Practical (L-T-P)*** component to indicate contact hours. Separate laboratory (practical) course may exist (0-0-P) in certain cases as decided.

7.6 The academic programmes of the Institute follow the credit system.

7.7 Each course shall have credits(C), which reflects its weightage. The number of credits of a course in a semester shall ordinarily be calculated as under:

$$\textit{Number of credits of a course, } C = L + T + (P/2)$$

where ***L, T, P*** represent the No. of Lecture, Tutorial and Practical hours / week

7.8 The students admitted for B.Tech. programme under Lateral Entry scheme have to be offered a mandatory course on "Environmental Studies" in the 4th semester of B.Tech. programme.

7.9 **Course Code:** Each course offered in the Undergraduate (B.Tech.) curriculum at this institute shall be listed by using a total of 8 digits, as follows:

Ex: **U18CE106**

a) The first letter, to represent the Under Graduate Programme
Ex. U for Undergraduate Course
b) The next two numbers, to represent the year in which the syllabus is proposed / revised.
Ex. 18 for the year 2018 from which syllabus is applicable for the batches admitted from academic year 2018-19
c) The next two letters, to represent the concerned department offering that course.
Ex. CE for Civil Engineering
d) The last three numbers, to represent the course number and semester in which it is being offered.
Ex. XYZ; X - Semester number ; YZ – Course number
106 represents course number 06 offered in first semester

In general, a **course code "U18CE106"** represents an **Undergraduate Course number-06 for the batches admitted from the year 2018 offered by the Department of Civil Engineering in first semester.**

7.10 The syllabus of each course in the B.Tech. curriculum shall be divided into four (4) units.

8. ATTENDANCE

8.1 All the students are normally required to have 100% attendance in aggregate. However, condonation for shortage of attendance upto 25% may be granted by the principal based on recommendation of HoD concerned.

8.2 The condonation for shortage of attendance upto 25% (as mentioned in Regulation No. 8.1) shall be taken up only when the student takes prior permission for his absence stating fully the genuine reasons along with supporting documents to the HoD concerned.

8.3 Hence, students not having the mandatory requirement of minimum 75% of attendance in aggregate shall be detained and shall not be permitted to appear for the MSE-II & ESE of that semester.

8.4 All such students who are detained have to repeat the entire semester when it is offered, by following the due registration procedure.

8.5 Attendance of all courses shall be entered before the end of each working day by the faculty concerned through the College Management System (CMS) portal of the institute website. Students are advised to monitor the status of their attendance through this CMS portal.

9. CONDUCT AND DISCIPLINE

9.1 All students shall be required to conduct themselves in a manner befitting the reputation of the institution, within and outside the premises of the Institute; and are expected to complete their studies without any break.

9.2 As per the order of Hon'ble Supreme Court of India, ragging in any form is strictly banned. Involvement of a student in ragging will be considered as a gross indiscipline and may lead to his / her expulsion from the Institute.

9.3 Detailed rules regarding the conduct and discipline (code of conduct) are made available on Institute website.

10. EVALUATION PROCEDURE

10.1 The evaluation of students in every course of 4-year B.Tech. programme (8 semesters) and Lateral Entry students of B.Tech. programme (6 semesters), is a continuous process and is based on their performance in different examinations as mentioned below:

a) Sessional, involving **Continuous Internal Evaluation (CIE)** conducted all through the semester which includes **Teachers Assessment (TA)** through assignments and **Mid-Semester Examinations (MSE)**

b) Terminal, often designated as **End Semester Examination (ESE)** which includes written examination for theory courses and practical/ design/ drawing examination with built-in oral part for laboratory/ design / drawing courses.

10.2 A student's performance in a course (subject) shall be judged by taking into account the result of CIE and ESE together.

10.3 CIE and ESE shall have 40:60 weightage i.e. CIE carrying 40% weightage and ESE carrying 60% weightage.

10.4 **Continuous Internal Evaluation (CIE) for Theory Course**:

10.4.1 CIE throughout the semester shall consist of TA and MSE.

10.4.2 The distribution given to each component of CIE for a theory course is given below:

S. No.	Particulars	Weightage
1.	Teacher's Assessment (TA) (**Assignments**)	10%
2.	Mid Semester Examination (MSE**) (MSE-I & MSE-II**)	30%
	Total Weightage	**40%**

10.4.3 **TA**:

a) There shall be 2 Assignments and 2 Minor exams (Quiz/Slip test, etc.) for each course at regular intervals of time

b) Minor-I shall be based on Unit-I syllabus, Minor-II shall be based on Unit-III syllabus, Assignment-I shall be based on Unit-I & Unit-II syllabi and to be submitted before MSE-I, Assignment-II shall be based on Unit-III & Unit-IV syllabi and to be submitted before MSE-II.

c) Average of Assignment-I, Assignment-II, Minor-I and Minor-II marks shall be taken under TA

10.4.4 **MSE**:

a) There shall be two mid semester examinations (MSE-I and MSE-II) of two-hour duration each.

b) It is mandatory for the student to take both MSEs

c) MSE evaluation shall be done as given below:

MSE marks awarded = (70% of the best of MSE-I & MSE-II marks)
+ (30% of the other MSE marks)

Ex: A student secured following marks
MSE-I marks = 10 out of 30
MSE-II marks = 20 out of 30
The MSE marks awarded will be = (70% of 20) + (30% of 10) = 14 + 3 =17

10.4.5 The marks obtained by the students in MSE must be submitted to the Controller of Examination (CoE) by the teachers within 1 week from the date of conduct of the examination.

10.4.6 The dates for MSE and ESE will be declared by the CoE in consultation with the Dean, Academic Affairs.

10.5 **End Semester Examination (ESE) for Theory Course**:
There shall be an End Semester Examination (ESE) at the end of each semester for three hour duration for each course.

10.6 **Continuous Internal Evaluation (CIE) for Practical (Laboratory) Course:**

10.6.1 CIE for practical course shall carry 40% weightage.

10.6.2 CIE throughout the semester shall consist of the following:

Assessment	Weightage
Regular Experimentation / Job work and Viva-voce	20%
Regular submission of record	10%
Quiz / Skill test / Viva-voce at the end of semester	10%
Total Weightage	**40%**

10.7 **End Semester Examination (ESE) for Practical (Laboratory) Course:**

10.7.1 There shall be an ESE at the end of each semester for three hour duration for each practical course.

10.7.2 The ESE for practical course shall carry 60% weightage.

10.7.3 The marks distribution at ESE shall be as follows:

Assessment	Weightage
Procedure / Experimentation / Tabulation / Result, as applicable …	45%
Viva-voce	15%
Total Weightage	**60%**

10.8 **Continuous Internal Evaluation (CIE) for Seminar & Mini Project :**

10.8.1 **Seminar**:

d) The HoD shall constitute a *Department Seminar Evaluation Committee (DSEC)*

e) *DSEC* shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective seminar presentation

f) There shall be only continuous Internal Evaluation (CIE) for seminar

g) The CIE for seminar is as follows:

Assessment	Weightage
Seminar Supervisor Assessment	20%
Seminar Report	30%
Seminar Paper	20%
DSEC Assessment: *Oral presentation with PPT and viva-voce*	30%
Total Weightage:	**100%**

Note: It is mandatory for the candidate to appear for oral presentation and Viva-voce to qualify for course evaluation.

h) **Seminar Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

i) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by *DSEC.*

j) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.

k) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DSEC* as per the schedule notified by the department

l) The candidate has to register the Seminar as supplementary examination in the following cases:
   (i) student is absent for oral presentation and viva-voce
   (ii) student fails to submit the report in prescribed format
   (iii) student fails to fulfil the requirements of seminar evaluation as per specified guidelines

m) Supplementary examination for seminar
   (i) The CoE shall send a list of candidates registered for supplementary to the HoD concerned
   (ii) The *DSEC*, duly constituted by the HoD, shall conduct seminar evaluation and send the award list to the CoE within the stipulated time

10.8.2 **Mini Project**:

a) The HoD shall constitute a *Departmental Mini Project Evaluation Committee (DMPEC)*

b) Every student shall take up independent Mini project on innovative ideas. However, wherever not feasible a group of 2 to 4 students shall be allowed to take up mini project. The *DMPEC* shall take a decision on number of students in a group.

c) *DMPEC* shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation

d) There shall be only Continuous Internal Evaluation (CIE) for mini project

e) The CIE for mini project is as follows:

Assessment	**Weightage**
Mini Project Supervisor Assessment	20%
Working model / process / software package / system developed	20%
Mini Project report	20%
Mini Project paper	10%
Video pitch	10%
DMPEC Assessment: *Oral presentation with PPT and viva-voce*	20%
Total Weightage:	**100%**

Note: It is mandatory for the candidate to appear for oral presentation and Viva- voce to qualify for course evaluation.

i) **Mini Project Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals/ Technical Magazines on the topics of potential interest

ii) **Working Model**: Each student is required to develop a working model/ process/ system on the chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*

iii) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by *DMPEC*

iv) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

v) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DMPEC* as per the schedule notified by the department

vi) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his/ her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his/ her business idea / plan (*if any*) and social impact

f) The candidate has to register the Mini project as supplementary examination in the following cases:
   (i) Student is absent for oral presentation and viva-voce
   (ii) Student fails to submit the report in prescribed format

(iii) Student fails to fulfill the requirements of Mini project evaluation as per specified guidelines.

g) Supplementary examination for mini project
   (i) The CoE shall send a list of candidates registered for supplementary to the HoD concerned
   (ii) The *DMPEC,* duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time.

10.9 **Evaluation for Major Project Work:**

10.9.1 Final year major project work is a team work and represents the culmination of study towards the B. Tech degree. **Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems**. The **Student Learning Assessment Process** (SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project work.

10.9.2 Activities of major project SLAP shall be planned in such a way to ensure that the students acquire the essential Knowledge, Skills and Qualities (KSQ) of a professional engineer.

10.9.3 Major project work shall be normally conducted in two stages: Major project work. *Phase-I* in seventh semester and Major project work *Phase-II* in eighth semester. Nearly 50 - 75% of the proposed work to be completed in 7th semester as *Phase-I* and the remaining work to be continued and completed in 8th semester as *Phase-II*

10.9.4 **Major Project *Phase-I*:**

a) Every student is expected to put approximately **72 hours of work** into the major project *phase-I* course over the 12 weeks of 7th semester

b) The HoD shall constitute a *Departmental Project Evaluation Committee (DPEC)*

c) The convener DPEC shall allot faculty supervisors to all project teams for guiding on (i) project objectives and expected deliverables (ii) plan their project work and timeline (iii) enough resources for successful project completion (iv) Knowledge, Skills and Qualities (KSQ) to be acquired to propose solutions to the identified real-world problem for the project work (v) preparing a well-documented report in proper format and (iv) effective major project oral presentation

d) The project supervisors shall ensure students focus on the project objectives, expected deliverables and students have sufficient resources for successful project completion

e) The project supervisors are also expected to continuously emphasize and guide the students on following project timeline, meeting cadence, activity journaling in project log book

f) There shall be only Continuous Internal Evaluation (CIE) for Major Project *Phase-I*

g) CIE for the Major Project *Phase-I* in seventh semester is as follows:

Major project work Phase-I Assessment *(7th semester)*	**Weightage**
A. Supervisor Assessment	**20%**
B. DPEC Assessment *(i) Registration Presentation (10%)* *(ii) Progress Presentation-I (20%)* *(iii) Project progress*: Part of working model/ process/software package/system developed (30%)* *(iii) Well-documented Progress Report on Phase-I work (10%)* *(iv) Video pitch on Phase-I (10%)*	**80%**
Total Weightage	**100 %**

** Students are advised to complete major part of the project in phase-I only*

g) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The progress made in this shall be demonstrated during progress presentation-I at the end of *phase-I* and the completed working model/ process/software package/system before the DPEC as per the dates specified by DPEC at the end of *phase-II*.

h) **Progress Report on *phase-I*:** Every project team shall be required to submit a well-documented progress report on dissertation phase-I as per format specified by DPEC.

i) **Video pitch on *phase-I*:** Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I*. It should be 3 to 5-minute-long video (no longer than 5 minutes), highlight the progress made at various stages during *phase-I* project implementation

j) A student shall register for supplementary examination for the Major project work *phase-I* in the following cases:
   (i) Student is absent for oral presentation and viva-voce as part of progress presentation-I
   (ii) Project team fails to submit the progress report on *phase-I* in prescribed format
   (iii) Project team fails to submit the video pitch on the progress made during the *phase-I* period.
   (iv) Student fails to fulfill the requirements of major project work *phase-I* evaluation as per specified guidelines

k) Supplementary examination for major project work *phase-I*
   (i) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned
   (ii) The DPEC shall conduct major project *phase-I* supplementary exam and send the award list to the CoE within the stipulated time

10.9.5 **Major Project *Phase-II*:**

a) All the major project teams shall take the *phase -I* work forward and complete the remaining work as *Phase-II* in the 8th semester.

b) Every student is expected to put approximately 168 hours of work into the major project *phase-II* course over the 12 weeks of 8th semester

c) The project supervisors are expected to guide the students to systematically continue the *phase-I* work, useful work during inter-semester break, meeting the deadlines as proposed in project timeline

d) The project supervisors shall ensure students focus on the project objectives and expected deliverables and ensure students have sufficient resources for successful project completion

e) The project supervisors are also expected to continuously emphasize and guide the students on following project timeline, meeting cadence, activity journaling in project log book.

f) The evaluation for Major Project work *Phase-II:* There shall be Continuous Internal Evaluation (CIE) and End Semester Examination (ESE). The evaluation for *phase-II* shall be as given below:

Assessment	Weightage
A. CIE **(i) Supervisor Assessment (10%)** **(ii) DPEC Assessment (50%)** *(a) Progress presentation-II (10%)* *(b) Final presentation (10%)* *(c) Working model / process / software package / system developed (20%)* *(d) Project video pitch (5%)* (e) *Project paper (5%)*	**60%**
B. ESE *(i) Well-documented project report (15%)* *(ii) Oral presentation with PPTs and viva-voce (15%)* (iii) *Project poster (5%)*	**40%**
Total Weightage	**100%**

g) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The completed working model/ process/software package/system shall be demonstrated during final presentation at the end of *phase-II*.

h) **Video pitch**: Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I & phase-II*. The project team shall present the produced video pitch during Final presentation

i) **Project poster**: At the end, the project teams shall present their project in the form of posters (A2 size). The teams shall have to present their work during the poster presentation session scheduled at the end of the 8th semester, at the time of demonstration of complete porotype / working model / software package / system developed.

j) **Well-documented plagiarism-cleared project report**: Every project team shall be required to submit a well-documented project report on the work carried out, as per the format specified by the DPEC. The report should clear plagiarism check as per the anti-plagiarism policy-2020 of the institute.

k) A student shall register for supplementary examination for the Major project work *phase-II* in the following cases:
   (i) Student is absent for oral presentation and viva-voce as part of ESE presentation
   (ii) Student fails to fulfill the requirements of major project work *phase-II* evaluation as per specified guidelines

l) Supplementary examination for major project work *phase-II*
   (i) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned
   (ii) The DPEC, duly constituted by the HoD, shall conduct major project *phase-II* supplementary exam and send the award list to the CoE within the stipulated time

10.10 **Evaluation for Internship:**

10.10.1 The students shall undergo 6-8 weeks internship during summer/winter vacation at industry/R&D organization / Academic Institutes like IITs, IIITs & NITs.

10.10.2 The students preferably shall undergo internship at one organization only. In case of any difficulty, the stipulated period of internship shall be completed at different organizations with minimum of one week internship at every stage.

10.10.3 The internship evaluation shall be done in the VII semester of study and hence the students shall complete the prescribed period of internship before start of VII semester (from end of II semester to commencement of VII semester).

10.10.4 The internship evaluation shall be done by ***Department Internship Evaluation Committee* (DIEC)** based on the submitted report by student and oral presentation.

10.10.5 There shall be only Continuous Internal Evaluation (CIE) for internship evaluation.

10.10.6 The CIE for the Internship evaluation in VII semester shall be as below:

Internship evaluation	Weightage
A. **Internship Supervisor's Assessment** *(i) Feedback from the internship supervisor* *- on completion of internship assignment / work (20%)* *(ii) Feedback from the internship supervisor* *- on quality of work in internship assignment / work (10%)* *(iii) Feedback from the internship supervisor* *- internship log book (10%)* *(iv) Feedback from the internship supervisor* *- on attendance, punctuality and work hours (10%)*	**50%**
B. DIEC Assessment *(i) Internship duration (8 /6 weeks) (15% / 10%)* *(ii) Internship Report (20%)* *(iii) Oral Presentation (with PPT) and viva voce (15%)*	**50%**
Total Weightage:	**100%**

Note: *It is mandatory for the student to appear for oral presentation (with PPT) and viva voce to qualify for course evaluation*

(a) **Internship Report:** Each student is required to submit a well-documented internship report (both *soft copy and softbound hard copy*) as per format specified by DIEC

(b) A student shall register for supplementary examination for the internship evaluation in the following cases:
   (i) absent for oral presentation and viva-voce
   (ii) fails to submit the internship report in prescribed format
   (iii) fails to fulfill the requirements of internship evaluation as per specified guidelines

(c) Supplementary examination for internship evaluation
   (i) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned
   (ii) The DIEC, duly constituted by the HoD, shall conduct internship evaluation supplementary exam and send the award list to the CoE within the stipulated time

10.11 **Evaluation of MOOCs:**

10.11.1 a) **SWAYAM-MOOCs:** Massive Open Online Courses (MOOCs) are such online courses which are developed as per the pedagogy and made available on the SWAYAM (Study Web of Active-learning by Young and Aspiring Minds) platform of *Government of India*

b) **SWAYAM** shall notify to all Institutions, on 1st June, 1st November every year, the list of online learning courses going to be offered in the forth coming semester.

10.11.2 a) The student shall be allowed to register for MOOCs courses for the designated Professional electives and Open electives mentioned in the curriculum.

b) The student shall select a relevant MOOCs course carrying 3 credits.

10.11.3 The Institutional MOOCs coordinator with the help of departmental MOOCs coordinator shall guide the students throughout the course.

10.11.4 **Evaluation and Certification of MOOCs**:

a) The Principal Investigator (PI) shall be a Subject Matter Expert (SME) belonging to a reputed educational institution, called Host Institution

b) The host Institution and PI shall be responsible for evaluating the registered students for MOOCs course

c) After conduct of examination and completion of the evaluation, the PI through host institution shall award Marks/Grade as per the evaluation scheme announced.

10.11.5 **Credit Mobility of MOOCs**:

a) Institution shall allow the credit mobility for the courses earned through MOOCs.

b) A certificate regarding successful completion of the MOOCs courses shall be issued through host Institution and sent to the parent institution.

c) The parent institution shall give equivalent credit weightage to the students for the credits earned through online learning courses through SWAYAM platform in the credit plan of the programme.

10.11.6 In case the student is unable to complete the MOOCs course, he/she shall be allowed to select one of courses listed under respective PE/OE offered at institute/department concerned and appear for supplementary examination. In such case, the student is deemed to have passed the course, if he/she scores minimum 35% of maximum marks allotted to the course in the registered supplementary ESE only (i.e. 35 marks out of 60 in ESE).

11. MINIMUM REQUIREMENT FOR PASSING A COURSE

11.1 **Theory Course**: A student is deemed to have passed in a theory course, if he / she secures

a) 35 percent of marks assigned to End Semester Examination (ESE) **and**

b) 35 percent of marks assigned to the Mid Semester Examination (MSE) & End Semester Examination (ESE) of the course taken together **and**

c) 35 percent of marks assigned to Teacher's Assessment (TA), Mid Semester Examination (MSE) and End Semester Examination (ESE) of the course taken together.

11.2 The marks assigned to MSE will be considered as per the Regulation no. 10.4.4

11.3 **Laboratory Course**: A student is deemed to have passed in a laboratory course, if he / she secures

a) 35 percent of marks assigned to End Semester Examination (ESE) **and**
b) 35 percent of marks assigned to the Teacher's Assessment (TA) and End Semester Examination (ESE) of the laboratory course taken together.

12. GRADING SYSTEM

12.1 At the end of the semester a student is awarded a letter grade in each of his / her courses taking into account the total marks secured (X) in that course

where, X = Marks secured in CIE + Marks secured in ESE

12.2 For arriving at a grade obtained by a student in a particular course (subject), initially numeric marks obtained by the student out of 100 are to be determined. Once a numeric mark is obtained, the same is to be converted to a letter grade following the guidelines given in 12.3 below.

12.3 The Institute shall follow absolute grading system. The grades will be awarded to each course as under:

Grade	Total Marks Secured (X)
S	$X \geq 90$
A	$80 \leq X < 90$
B	$70 \leq X < 80$
C	$60 \leq X < 70$
D	$45 \leq X < 60$
P	$35 \leq X < 45$
F	$X < 35$

12.4 The typical grades and their numerical equivalents on 10-point scale (called Grade Points) are as follows:

Performance	Letter Grade	Grade Points (G_i)
Superior	S	10
Excellent	A	9
Very Good	B	8
Good	C	7
Average	D	6
Pass	P	4
Fail	F	0

12.5 **F-Grade** is a Fail Grade. The course in which the student has earned F-Grade will be termed as backlog course.

12.6 In addition, there shall be a transitional **M-Grade.** M-Grade for "Debarred" due to indiscipline / malpractice during examination.

12.7 A Semester Grade Point Average (SGPA) will be computed for each semester. The SGPA will be calculated as follows:

$$\text{SGPA} = \sum_{i=1}^{n} C_i G_i \Big/ \sum_{i=1}^{n} C_i$$

where 'n' is the no. of courses (subjects) offered (excluding mandatory non-credit courses) for the semester, 'C_i' is the credits allotted to a particular course, 'G_i' is the grade-points carried by the letter corresponding to the grade awarded to the student for the course as illustrated in 12.4.

12.8 The SGPA would indicate the performance of the student in the semester to which it refers. SGPA will be rounded off to the second place of decimal and recorded as such.

12.9 Starting from the second semester, at the end of each semester, a Cumulative Grade Point Average (CGPA) will be computed for every student as follows:

$$\text{CGPA} = \sum_{i=1}^{m} C_i G_i \Big/ \sum_{i=1}^{m} C_i$$

where 'm' is the total number of courses (subjects) the student has been offered from the first semester onwards upto and including the present semester, 'C_i 'and 'G_i' are as explained in 12.7.

12.10 The CGPA would indicate the cumulative performance of the student from the first semester up to the end of the semester to which it refers. CGPA will be rounded off to the second place of decimal and recorded as such.

12.11 SGPA and CGPA are calculated in consideration of only credits cleared, i.e. F-Grade credits are not included for calculation.

13. SUPPLEMENTARY EXAMINATIONS

13.1 A student who obtained the F-Grade in a course (theory or practical) can appear in a subsequent End Semester Examination (ESE) in the same course as supplementary candidate.

13.2 However the marks secured in Continuous Internal Evaluation (CIE) by the student in that course during the semester study shall remain unaltered.

13.3 The students those who have passed in the supplementary examination will be awarded grade with **'*'** marked on the courses passed in the supplementary.

13.4 **Makeup Examination for VIII semester courses:**
Makeup Examination for the students having backlog courses at VIII semester of 4th year B.Tech. programme shall be conducted immediately after the release of VIII semester regular examinations result.

14. REVALUATION

a) Revaluation is allowed for only theory courses.

b) If the award of the revaluator varies from the original award by less than or equal to 20% of maximum marks prescribed for the course, the original award shall be taken as final.

c) If the award of the revaluator varies from the original award by more than 20% of the maximum marks prescribed for the course, the answer script will be examined by the second revaluator. If the award ofthe bothrevaluators is more than 20% of the maximum marks prescribed for the course, then average of the two revaluated awards thus available shall be taken as final. Otherwise, the original award shall be taken as final.

15. CONDITIONS FOR PROMOTION

15.1 A student shall have to satisfy the attendance requirements for the semester (as per the Regulation No. 8) for promotion to the next higher semester. In addition,

a) for promotion to the fifth semester, a student should not have more than four backlogs in the first and second semesters taken together.

b) for promotion to the seventh semester, a student should not have more than four backlogs in the courses of first to fourth semester taken together.

c) the grade (marks) secured in mandatory non-credit courses will not be counted for the purpose of backlogs. However, a minimum P-Grade is compulsory in those courses for the award of the degree.

16. IMPROVEMENT EXAMINATION

16.1 Students who wish to improve their SGPA / CGPA are permitted for SGPA / CGPA improvement only for theory courses. The student may opt to re-appear all the courses of a semester at the immediately succeeding End Semester Examination (ESE) for improving his / her grades. However, the students should clear all the courses of a particular semester in which he / she intends to take an improvement examination.

16.2 Further, when once the student appears for the improvement examination, he / she shall forego the grades secured in the earlier End Semester Examination (ESE) in the whole set of courses prescribed for that semester. However, the marks secured in Continuous Internal Evaluation (CIE) by the student in those courses during the semester study shall remain unaltered.

16.3 Students those who have re-appeared for improvement will be awarded grade with **'$'** marked on the courses appeared for improvement examination. **'$'** will state the grade improvement. Such improved grades will not be counted for the award of Prizes, Medals and Rank.

16.4 However, the students who register for improvement examinations and wish to drop from appearing the examinations, by written application to the CoE, before commencement of examinations, shall be permitted to retain their earlier grades.

17. GRADUATION REQUIREMENT

17.1 A student shall be declared to be eligible for award of the B.Tech. degree, if he / she has registered and completed all the courses with a minimum P-grade scored in every course and secured a total of stipulated 160 credits.

17.2 Normally a student should complete all the requirements consecutively in 8 semesters (4 academic years) for the award of B.Tech. degree. However, the students who fail to fulfill all the requirements for the award of B.Tech. degree within a period of 16 consecutive semesters (8 academic years from the registration in 1st semester) shall forfeit his / her enrolment to the program.

17.3 The students admitted in the lateral entry scheme should complete all the requirements consecutively in 6 semesters (3 academic years) for award of B.Tech. degree. However, the students who fail to fulfill all the requirements for the award of B.Tech. degree within a period of 12 consecutive semesters (6 academic years from the registration in 3rd semester) shall forfeit his / her enrolment to the program.

17.4 a) **CGPA to Percentage conversion**: As per UGC and AICTE guidelines, the CGPA will be converted to percentage of marks as below:

Percentage of marks = (CGPA – 0. 50) x 10

Ex: If CGPA is 6.75, the equivalent Percentage of marks = (6.75-0.50) x 10 = 62.5%

b) CGPA to Class conversion:

S. No.	Division	Eligibility Criteria
1	First Division with Distinction	a) Student should secure CGPA≥8.0 b) Student should pass all the courses along with the batch of students admitted with him/her within 8 consecutive semesters (6 consecutive semesters for lateral entry students) c) Student who appeared for improvement examination upto 6th semester will also be considered d) Student who have cleared any course in supplementary examination shall not be awarded Distinction
2	First Division	a) Student should secure CGPA, which is 6.50 ≤ CGPA < 8.0 within the time frame of the programme i.e. 16 semesters (12 semesters in case of lateral entry students) b) Student who have cleared any course in supplementary examination and secured CGPA≥6.50
3	Second Division	Student should secure CGPA, which is 5.50 ≤ CGPA < 6.50 within the time frame of the programme i.e. 16 semesters (12 semesters in case of lateral entry students)
4.	Pass Division	Student should secure CGPA, which is 4.0 ≤ CGPA < 5.50 within the time frame of the programme i.e. 16 semesters (12 semesters in case of lateral entry students)
5.	Fail	Student with CGPA < 4.0 will not be eligible for award of degree

17.5 **Honours / Minor in Engineering can be conferred as per AICTE guidelines and Model curriculum January 2018**

A student will be conferred with Under Graduate degree as "*Bachelor of Technology in XXX Engineering/Technology, with Honours*" (or) "*Bachelor of Technology in XXX Engineering/Technology, with Minor in YYY Engineering/Technology*", if he/she completes an additional 20 credits. These additional 20 credits could be acquired through SWAYAM-NPTEL MOOCs / other MOOCs such as Coursera, Udemy, IITB spoken tutorials. These additional 20 credits earned through SWAYAM-NPTEL MOOCs /other MOOCs should be in addition to the credits acquired through SWAYAM - MOOCs offered in the curriculum as part of Professional Electives/ Open Electives. The University will award degrees to the students who are evaluated and recommended by the Institute.

17.5.1 **Honours:** Honours is an additional credential a student may earn, if he/she does additional learning for 20 credits *in his/her own discipline* of B.Tech programme. These additional credits shall be acquired through MOOCs from the *list of courses for Honours,* prescribed by the respective departments. These courses shall mostly be advanced courses (or) courses designed to give more exposure to different areas of one's own discipline. On

successful accumulation of these additional credits, at the time of graduation, it shall be mentioned in the degree certificate as "*Bachelor of Technology in XXX Engineering / Technology, with Honours*".

17.5.2 **Minor in Engineering:** A minor in engineering is an additional credential a student may earn, if he/she does additional learning for 20 credits *in a discipline other than his/her major discipline* of B.Tech programme. These additional credits shall be acquired through MOOCs from the *list of courses for a Minor Engineering* prescribed by the respective departments. On successful accumulation of these additional credits, at the time of graduation, it shall be mentioned in the degree certificate as "*Bachelor of Technology in XXX Engineering / Technology, with Minor in YYY Engineering/Technology*".

17.5.3 A student shall be eligible to register for a Honours in the same discipline of his/her study, and/or a Minor in Engineering offered by other department.

17.5.4 A student can register for both Honours in the same discipline and also a Minor in Engineering in other discipline. On successful accumulation of prescribed credits for Honours and also prescribed credits for Minor in Engineering, at the time of graduation, it shall be mentioned in the degree certificate as "*Bachelor of Technology in XXX Engineering / Technology, with Honours and Minor in YYY Engineering/Technology*".

17.5.5 Student who has completed B.Tech. IV semester in his/ her regular B.Tech. programme without any standing backlogs and with a minimum CGPA of 8.0 shall be allowed to register for Honours and/or Minor in Engineering.

17.5.6 Student who wants to register for Honours and/or Minor in Engineering shall opt for registration at the end of IV semester of his/ her B.Tech. programme, subject to the conditions prescribed by the AAC from time to time.

17.5.7 Student registered for Honours and/or Minor in Engineering shall ensure the following in his/her regular B.Tech programme

(i) student should maintain a minimum SGPA of 7.0 from V semester to VIII semester of regular B.Tech programme and

(ii) student should maintain a CGPA of 8.0 at the end of VIII semester of regular B.Tech programme

If the student fails to meet the above criteria, his/her registration for Honours and/or Minor in Engineering shall stand cancelled and he/she will be awarded only regular B.Tech degree.

17.5.8 A student may withdraw from Honours/Minor in Engineering at any time before graduating. Such students shall submit an application for withdrawal to the Dean AA, before start of any semester. The Dean AA, shall communicate the list of such students to the HoDs concerned (parent-department /minor-department) with a copy to the CoE.

17.5.9 During the curriculum revision, the HoDs in coordination with their Department Academic Advisory Committee (DAAC) shall identify the list of courses to be offered by the department under Honours curricula/ Minor in Engineering curricula and forward the same to the office of the Dean AA.

17.5.10 Student shall be permitted to take a maximum of 2 theory courses and one laboratory course during any semester for additional learning towards Honours curricula/ Minor in Engineering curricula.

17.5.11 Student shall take laboratory courses, listed under Honours curricula/Minor in Engineering curricula, in the parent-department/minor-department during inter-semester break and complete the course with a course project.

17.5.12 Office of the Dean AA shall compile and release list of courses under Honours curricula/ Minor in Engineering curricula for different departments/ programmes/disciplines, highlighting the importance of each discipline.

17.5.13 By the end of April of every academic year, the Dean AA in coordination with HoDs shall notify the department wise list of equivalent courses in MOOCs/ SWAYAM-NPTEL MOOCs against the list of courses notified under Honours curricula/ Minor in Engineering curricula, by respective departments.

17.5.14 Office of the Dean AA shall release registration notification for Honours/ Minor in Engineering, during even semester of every academic year inviting interested students of B.Tech IV semester to apply.

17.5.15 Interested students shall submit three (03) copies of applications in the prescribed format, *notified by the Dean AA*, along with supporting documents to the concerned HoD in the parent-department. The HoD in coordination with DAAC shall scrutinize the submitted applications and forward the consolidated list of registered students along with two sets of applications to the Dean AA.

17.5.16 The Dean AA shall notify, in coordination with the CoE, the list of eligible students towards **Honours** and forward this list to the **parent-department**. These notified students shall be allowed to do additional learning towards Honours in Engineering from V semester onwards.

17.5.17 The Dean AA shall notify, in coordination with the CoE, the list of eligible students towards Minor in Engineering and forward this list to the minor-department in which student opted to gain prescribed credits for Minor in Engineering along with one set of application. These notified students shall be allowed to do additional learning towards Minor in Engineering from V semester onwards.

17.5.18 In the process of additional learning towards Honours/ Minor in Engineering, the student shall exercise carefully all options to ensure the following:

(i) The credits earned in a course studied in regular curriculum towards fulfilment of basic degree, shall not be claimed under credits for additional learning towards Honours/ Minor in Engineering and vice versa

(ii) A course once studied in regular curriculum, shall not be taken again for additional learning towards Honours/ Minor in Engineering

17.5.19 The HoD in coordination with department MOOCs coordinator and faculty counsellor concerned, shall monitor progress of the registered student during the semester for successful completion of registered courses of Honours curricula.

17.5.20 The minor-department HoD in coordination with minor-department MOOCs coordinator and faculty counsellor concerned, shall monitor progress of the registered student during the semester for successful completion of registered courses of Minor in Engineering curricula.

17.5.21 On successful completion of registered courses, the student shall submit the course completion details in "Semester wise progress report (*for additional learning towards Honours/Minor in Engineering*)" in the prescribed format notified by the Dean, AA along with Certificate/ Grade sheet/ Mark sheet (indicating credits of the course) to the HoDs concerned (parent-department /minor-department).

17.5.22 The HoDs shall consolidate "Semester wise progress report (*for additional learning towards Honours/Minor in Engineering*)" of all the students registered for *Honours/Minor in Engineering* in their departments and forward the same to the Dean AA.

17.5.23 The Dean AA shall ensure genuineness of the submitted certificates, of registered students, with the help of the Institute MOOCs coordinator and forward the semester wise progress of registered students to the CoE.

17.5.24 The CoE shall ensure for reflecting the earned credits for additional learning towards Honours/Minor in Engineering in corresponding student semester grade sheet, subsequently in consolidated grade sheet and transcripts.

17.5.25 Separate CGPA for Honours and/or Minor in Engineering shall be mentioned in the consolidated grade sheet.

17.5.26 The students who have registered for Honours/ Minor in Engineering but unable to accumulate the 20 credits prescribed towards Honours/ Minor in Engineering at the time of graduation, he/she shall be awarded the Degree in his/her discipline without any mention about Honours/ Minor in Engineering.

17.6 The University will award degrees to the students who are evaluated and recommended by the Institute.

18. MALPRACTICE IN EXAMINATION

18.1 Malpractice in examination is an illegal activity and is prohibited.

18.2 Mobile phones are strictly prohibited in the examination hall.

18.3 Exchange of question paper and material like pen, pencil, sharpener, eraser, scale, calculator, etc., during examination is strictly prohibited.

18.4 Malpractice in examination is viewed very seriously. Malpractice includes oral communication between candidates, possessing forbidden material, mobile phones (switched off/on) etc.

18.5 Any malpractice or engaging in any improper conduct and violation of the examination code by the student during examinations is liable for the punishment as given below:

S. No	Nature of Malpractice	S. No	Punishment
1.	Taking help from others, consulting and or helping other examinees during the examination period inside the examination hall or outside it, with or without their consent or helping other candidates to receive help from anyone else	a)	Cancelling the examination of the paper in which he / she indulged in malpractices
2	If the examinee attempts to disclose his / her identity to the valuer by writing his / her Hall-Ticket Number at a place other than the place prescribed for it or any coded message including his / her name or addressing the valuer in any manner in the answer book		Cancelling the examination of the paper in which he / she indulged in malpractices
3.	Candidate is found in possession of forbidden material; relevant or not relevant but not used	b)	Cancellation of the result of (i) all examinations taken including current examination in that session (or) (ii) current examination and proposed examinations to be taken during that session (or) (iii) current examination
4.	Destroying the material found in his / her possession or acting in any other manner with a view to destroying evidence	c)	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibiting his/her admission to or continuation in any course of the Institute for a period of one year. The student will be eligible to appear for the next corresponding semester / year examination in the succeeding academic year
5.	Smuggling main answer book / additional answer book / question paper / matter in to or out of the examination hall & Conspiring to interchange Hall Ticket Numbers		-do-
6.	Candidate is found in possession of forbidden material, relevant or not relevant but used		-do-
7.	In case of (i) impersonation, (ii) misbehavior with the invigilators/any person related to examination work, (iii) insertion of written sheets in different hand writing in the main/additional answer book, and (iv) creation of disturbance in and around the examination hall during or before the examination	d)	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibiting his/her admission in to or continuation in any course of the Institute for a period of two years. Further, the candidate shall not be allowed to appear for any examination during the period of punishment
8.	If a candidate is found guilty of malpractice in the improvement examination (after completion of course)	e)	Punishment will be awarded subject to the above rules and further, he/she will not be permitted to appear for further improvement examination

19. ROLL NUMBER ALLOTMENT

The Roll Number given to the student shall have a total 8 digits as follows:

Ex: **B18CE108**

a) The first letter, to represent Bachelors (B.Tech.) degree programme.
   Ex: B for **B**.Tech. programme
b) The next two numbers, to represent the year in which the student admitted into I semester.
   Ex: 18 for 20**18**
c) The next two letters, to represent the concerned department to which the student belongs.
   Ex: CE for **C**ivil **E**ngineering
d) The last three numbers, to represent the three - digit roll number of the student.

In general, a **student with roll number** "**B18CE108**" represents a **B.**Tech. student admitted in 20**18** in **C**ivil **E**ngineering bearing a roll number **108.**

20. AMENDMENTS

Notwithstanding anything contained in this manual, the Academic Council of the Institute reserves the right to modify / amend the curricula, requirements and rules & regulations pertaining to its undergraduate programmes, without any further notice.

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ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2022 Rank Band : 201-250

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत
కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము
(An Autonomous Institute under Kakatiya University, Warangal)
(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)
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URR-18R22

Syllabi of B.Tech. (I & II semesters)

Common for all Branches

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)
SCHEME OF INSTRUCTION & EVALUATION (*Applicable from B21 batch*)

URR-18R22

I-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

BRANCH : B.Tech. – ME / CSE / CSN / IT/ CSIoT (Stream – I) **[5Th+4P+2MC]**

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH101	Engineering Mathematics – I	3	1	-	4	10	30	40	60	100
2	ESC	U18CS102	Programming for Problem Solving using C	3	-	-	3	10	30	40	60	100
3	BSC	U18PH103	Engineering Physics	3	1	-	4	10	30	40	60	100
4	HSMC	U18MH104	Engineering for Communication	2	-	2	3	10	30	40	60	100
5	ESC	U18EE105	Basic Electrical Engineering	3	1	-	4	10	30	40	60	100
6	ESE	U18EE106	Basic Electrical Engineering Laboratory	-	-	2	1	40	-	40		100
7	ESC	U18CS107	Programming for Problem Solving using C Laboratory	-	-	2	1	40	-	40	60	100
8	BSC	U18PH108	Engineering Physics Laboratory	-	-	2	1	40	-	40	60	100
9	ESC	U18ME109	Workshop Practice	-	-	2	1	40	-	40	60	100
10	MC	U18EA110	EAA* : Sports / Yoga / NSS	-	-	2	-	100	-	100	-	100
11	MC	U18EA111	Universal Human Value-I (*Induction Programme*)	-	-	-	-	-	-	-	-	-
			Total:	14	3	12	22	310	150	460	480	1000

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] EAA: Extra Academic Activity * indicates mandatory non-credit course

Total Contact Periods/Week: 29 **Total Credits: 22**

Stream-I: ME, CSE, IT, CSN,CSE(IOT) **Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION (*Applicable from B21 batch*)
II-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM
BRANCH : B.Tech. – ME / CSE / CSN / IT / CSIoT (Stream – I) **[5Th+2P+2MC]**

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH201	Engineering Mathematics – II	3	1	-	4	10	30	40	60	100
2	ESC	U18CS202R1	Data Structures through C	3	-	-	3	10	30	40	60	100
3	BSC	U18CH203	Engineering Chemistry	3	1	-	4	10	30	40	60	100
4	ESC	U18ME204	Engineering Drawing	2	-	4	4	10	30	40	60	100
5	ESC	U18CE205	Engineering Mechanics	3	1	-	4	10	30	40	60	100
6	ESC	U18CS207R1	Data Structures through C Laboratory	-	-	2	1	40	-	40	60	100
7	BSC	U18CH208	Engineering Chemistry Laboratory	_	_	2	1	40	-	40	60	100
8	MC	U18CH209	Environmental Studies*	2	_	-	-	10	30	40	60	100
9	MC	U18EA210	EAA* : Sports / Yoga / NSS*	-	-	2	-	100	-	100	-	100
Total:				16	3	10	21	240	180	420	480	900

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] EAA: Extra Academic Activity * indicates mandatory non-credit course

Total Contact Periods/Week: 29 **Total Credits: 21**
Stream-I: ME, CSE, IT, CSN,CSE(IOT) **Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)**

U18MH101 ENGINEERING MATHEMATICS- I

Class: B.Tech. I-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT) CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in

LO1: basic concepts of convergence of a series, mean value theorems, expansion of a function in series

LO2: partial differentiation and it's applications to functions of two/several variables

LO3: differential equations of first order and first degree along with certain applications

LO4: the methods of solving higher order linear differential equations and introduce few applications to engineering problems

UNIT-I (9+3)

Infinite Series: Sequences & Series, General properties of series, Series of positive terms, Comparison test, Limit comparison test, Integral test, D'Alembert's Ratio test, Cauchy's nth root test, Alternating series- absolute convergence.

Differential Calculus (Functions of One Variable): Limits, Continuity, Differentiability, Rolle's theorem (Physical and algebraic interpretations), Lagrange's mean value theorem (Geometrical interpretation), Cauchy's mean value theorem. Taylor's theorem and Power series representation of functions, Maclaurin's series, Asymptotes and Tracing of Simple Curves

UNIT-II (9+3)

Differential Calculus (Functions of Several Variables): Partial differentiation, Total differentiation, Change of variables, Application to find Tangent plane and Normal to a surface, Jacobians. Taylor's theorem for function of two variables (without proof), Maximum and minimum values of functions of two variables. Langrage's method of undetermined multipliers. Differentiation under integral sign.

UNIT-III (9+3)

Differential Equations of First Order: Practical approach to differential equations. Formation and solution of differential equation. Solution of first order and first degree differential equation, variables separable form, homogeneous form, reducible to homogeneous form, First order linear equations, Equations reducible to linear equation (Bernoulli's equation), Exact differential equations, Equations reducible to exact form.

Applications of First Order Differential Equations: Simple examples of Physical applications (Orthogonal trajectories, RL series circuit problem).

UNIT-IV (9+3)

Higher Order Linear Differential Equations with Constant Coefficients: Linear differential Equations of higher order with constant coefficients, General solution, Complementary function, Particular Integral; Methods of evaluation of particular Integrals; Wronskian, Linear dependence of solutions, Method of Variation of parameters; Cauchy's homogenous linear equation; Applications: Simple examples of RLC series circuit problem;

Text Books:

[1] Grewal, B.S., Higher Engineering Mathematics, 43/e, Delhi, *Khanna Publishers* ,2014.

Reference Books:

[1] Kreyszig E, Advanced Engineering Mathematics,9th edition, Inc, U.K, John wiely *& sons*, 2013.

[2] Shanti Narayan, Differential Calculus, New Delhi, S. Chand & Co

[3] S.S. Sastry, Engineering Mathematics 3/e, Vol.II, Prentice Hall of India,2014

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: *demonstrate the convergence of a series and interpret mean value theorems*

CO2: *apply partial differentiation to functions of several variables in solving various engineering problems*

CO3: *utilize appropriate methods of differential equations of first order and first degree in solving real life engineering problems*

CO4: *solve the higher order linear differential equation with constant coefficients and few problems on engineering applications*

Course Articulation Matrix (CAM): U18 MH101 ENGINEERING MATHEMATICS- I

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18MH101.1	3	2	1	--	--	--	--	1	--	1	--	1	1	1
CO2	U18MH101.2	3	3	2	--	--	--	--	1	--	1	--	1	1	1
CO3	U18MH101.3	3	2	2	--	--	--	--	1	--	1	--	1	1	1
CO4	U18MH101.4	3	3	2	--	--	--	--	1	--	1	--	1	1	1
U18MH101		**3**	**2.5**	**1.75**	--	--	--	--	**1**	--	**1**	--	**1**	**1**	**1**

U18CS102 PROGRAMMING FOR PROBLEM SOLVING USING C

Class: B.Tech. I -Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT) CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in

***LO1**: computer fundamentals and concepts of problem solving using structured programming paradigm*

***LO2**: control structures and array operations*

***LO3**: string functions and modular programming concepts*

***LO4**: structures, unions, pointers and files in C programming*

UNIT-I (9)

Introduction to Computers: Block diagram of computer, types of computers, computer languages, problem solving and program development steps, algorithm, flowchart

Overview of C: History, basic structure of C program

Constants, Variables and Data Types: Character set, C tokens, declaration of variables, symbolic constants and macros

Operators and Expressions: Arithmetic, relational, increment, decrement, conditional, logical, bit-wise, special operators, arithmetic expressions, precedence of operators and associativity

Managing Input and Output Operations: Reading a character, writing a character, formatted input, formatted output

UNIT-II (9)

Decision Making and Branching: Simple if, if-else, nested–if, else-if ladder, switch, conditional operator, goto statement

Decision Making and **Looping:** While, do-while, for statements, nested loops, break and continue statements

Arrays: One dimensional array, declaration of one dimensional arrays, initialization of one dimensional arrays, two dimensional arrays, initializing two dimensional arrays, linear search

UNIT-III (9)

Character Arrays and Strings: Reading strings, writing strings, string handling functions, table of strings

User Defined Functions: Need of user defined functions, definition of function, return values and their types, function calls, function declaration, category of function, no arguments and no return values, arguments but no return values, arguments with return values, no arguments but returns a value, recursion, storage classes

UNIT-IV (9)

Structures and Unions: Declaring structure variables, accessing structure members, array of structures, structures within structures, unions

Pointers: Understanding **pointers**, declaring and initializing pointer variables, pointer expressions, pointers and arrays, pointers and character strings, array of pointers, pointers as function arguments, pointers and structures

File Management in C: Defining and opening a file, input and output operations on sequential text files

Text Books:

1. E.Balagurusamy, Programming in ANSIC, 6th ed, New Delhi: Tata McGraw Hill, 2012

Reference Books:

1. Kerninghan and Ritchie, The C Programming Language, 2nd ed, New Delhi: Prentice Hall of India, 1988
2. A.K.Sharma, Computer Fundamentals and programming in C, Hyderabad: Universities Press, 2018.
3. Peter Norton, Introduction to Computers, 6th ed. New Delhi: Tata McGraw-Hill, 2008
4. Herbert Schildt, Complete Reference with C, 4th ed. New Delhi: Tata McGraw Hill, 2000
5. Yaswanth Khanetkar, Let Us C, 13th ed. Bangalore: BPB Publications, 2012

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of the course, the students will be able to,

***CO1**: demonstrate knowledge on fundamental of C programming language and design an algorithm & flow chart for a given application*

***CO2**: apply logical skills for problem solving using control structures and arrays*

***CO3**: develop string programs and modular programming withfunctions*

***CO4**: implement structures, unions, pointers and files in Cprogramming*

Course Articulation Matrix (CAM): U18CS102 PROGRAMMING FOR PROBLEM SOLVING USING C															
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CS102.1	1	1	-	-	-	-	-	1	-	1	-	1	1	2
CO2	U18CS102.2	1	2	2	1	-	-	-	1	-	1	-	1	1	2
CO3	U18CS102.3	1	2	2	1	-	-	-	1	1	1	-	1	1	2
CO4	U18CS102.4	1	2	2	2	1	-	-	1	1	1	-	1	1	2
U18CS102		1	1.75	2	1	1	-	-	1	1	1	-	1	1	2

U18PH103 ENGINEERING PHYSICS

Class: B.Tech. I– Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: different types of oscillations with illustrations by mechanical and electrical examples, high frequency sound waves and their applications in various fields

LO2: concepts of interference, diffraction and polarization of light waves and their applications

LO3: concepts and working principles of lasers, fiber optics and their applications in various fields

LO4: basic concepts of quantum mechanics, modern materials and their applications

UNIT-I (9+3)

Oscillations: Physical examples of simple harmonic motion: Torsional pendulum, Physical pendulum; Spring-mass systems; Loaded beams; two body oscillations; Qualitative treatment of free, damped and forced oscillations- resonance; Series and parallel resonant circuits, Q-factor.

Ultrasonics: Properties of ultrasonics; Production of ultrasonic waves: Magnetostriction method and Piezo-electric method; Detection of ultrasonic waves; Acoustic grating- Determination of wavelength of ultrasonics; Applications of ultrasonic waves- Pulse echo NDT technique (reflection mode).

UNIT-II (9+3)

Interference: Superposition principle; coherence; phase change on reflection; Interference of reflected light from uniform thin films; anti reflection coating; Newton's rings in reflected light- applications: determination of wavelength of a monochromatic light and refractive index of a liquid; Michelson's Interferometer- applications: determination of wavelength of a monochromatic light, thickness and refractive index of a thin transparent sheet;

Diffraction: Distinction between Fresnel and Fraunhofer class of diffraction; Fraunhofer diffraction at a single slit (phasor method) and a circular aperture- Rayleigh's criterion for resolution; Diffraction grating (qualitative)- Dispersive power and resolving power of a diffraction grating; determination of wavelength of a monochromatic light using diffraction grating.

Polarisation: Polarised light; double refraction; geometry of calcite crystal; Nicol prism; Huygen's explanation (positive and negative crystals); quarter and half wave plates; Production and detection of plane, circularly and elliptically polarized light; Applications- Optical activity, LCDs.

UNIT-III (9+3)

Lasers (Qualitative): Difference between conventional and laser light; Absorption; Spontaneous and stimulated emission; Relation among Einstein coefficients; Basic principles - Population inversion, pumping methods, optical resonator; Types of lasers- Ruby, Nd-YAG, He-Ne and CO_2 Laser; Applications of lasers: Holography- introduction, formation and reconstruction of a hologram; Applications of holography.

Fiber Optics(Qualitative): Introduction- Total internal reflection; Fiber construction; Numerical aperture and acceptance angle; Types of optical fibers- Step index and graded index; V-number; Fiber drawing- Double crucible technique; Splicing- Fusion & Mechanical; Power losses in optical fibers- Attenuation, dispersion, bending; Fiber optic communication system; Applications of optical fibers - endoscope; Fiber optic sensors (temperature and displacement).

UNIT-IV (9+3)

Elements of Quantum Mechanics: de-Broglie concept of matter waves- de-Broglie wavelength, properties of matter waves; Schrodinger time-independent wave equation (one dimension); Physical significance of wave function (Max Born interpretation); Particle in a box (one dimension)- energy quantization; Uncertainty principle - illustration and application to the non- existence of free electron in the nucleus.

Modern Materials (Qualitative):

Magnetic Materials: Introduction- Origin of magnetic moment; Bohr magneton; Permeability; Magnetization; susceptibility; Classification of magnetic material; Applications of magnetic materials: Magnetic recording and Magnetic memories.

Superconducting Materials: Superconductivity; Meissner effect; Transition temperature; Isotope effect; London's penetration depth; Type-I and Type-II superconductors; High T_c superconductors; Applications of superconductors.

Nanomaterials: Introduction- Classification of nanomaterials; Surface area to volume ratio; Quantum confinement; Properties of nanomaterials- Physical, chemical, electrical, optical, magnetic and mechanical properties; Applications of nanomaterials (in brief); Synthesis of nanomaterial: Bottom up approach (sol-gel method) and Top down approach (ball milling method).

Text Books:

1. Bhattacharya and Bhaskaran, *Engineering Physics*, Oxford University Press, 1/e, 2013.
2. V. Rajendran, *Engineering Physics*, Mc Graw Hill, 2013.

Reference Books:

1. David Halliday, Robert Resnick & Krane, *Physics Volume I & II*, Wiley India Limited, 5/e, *2014.*
2. R.K. Gaur and S.L.Gupta, *Engineering Physics*, Dhanpath Rai and Sons, 2013.
3. P.K. Palanisamy, *Engineering Physics*, Scitech Publishers, 3/e, 2013.
4. M. Avadhanulu and Kshirsagar, *A Text Book of Engineering Physics*, S. Chand & Company Ltd, 10/e, 2013.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of the course, the students will be able to

CO1: determine the time period and frequency of SHM oscillatory system and know the principles and applications of ultrasonics in different fields

CO2: appraise the concepts of interference, diffraction and polarization phenomena in accurate determination of wavelengths, thicknesses, narrow slit widths, optical activity, etc

CO3: interpret the characteristics and working of lasers, optical fibers and their applications in various fields

CO4: categorize the properties of magnetic, superconducting and nanomaterials and know their engineering applications

Course Articulation Matrix (CAM): U18PH103 ENGINEERING PHYSICS

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18PH103.1	2	1	-	-	1	1	-	1	1	1	-	1	1	1
CO2	U18PH103.2	2	1	1	1	-	1	1	1	1	1	-	1	1	1
CO3	U18PH103.3	3	1	1	1	2	1	1	1	1	1	-	1	1	1
CO4	U18PH103.4	3	-	1	1	1	2	1	1	1	1	-	1	1	1
U18PH103/ U18PH203		2.5	1	1	1	1.33	1.25	1	1	1	1	-	1	1	1

U18MH104 ENGLISH FOR COMMUNICATION

Class: B.Tech. I-semester
B.Tech.II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
2	–	2	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in

LO1: accuracy in and familiarity with various sentence structures to communicate correctly and effectively

LO2: judicious and situational use of vocabulary to bring effectiveness to communication

LO3: various reading skills to comprehend the text

LO4: writing strategies, academic writing, pre-planning before writing and maintenance of coherence while writing a paragraph

UNIT-I (6)

Grammar:

Clause Analysis - Types of Clauses: Noun Clause - Relative Clause - Adverb Clause.

Transformation: Simple, Complex, Compound Sentences.

Errors-Nouns-Pronouns-Adjectives-Adverbs-Prepositions-Tenses-Articles-Subject-Verb Agreement

Reading

"In Banaras"- from "The Stories of My Experiments with Truth-An Autobiography of Mahathma Gandhi"

UNIT-II (6)

Vocabulary:

Vocabulary-Antonyms-Synonyms-Prefixes-Suffixes-Phrasal Verbs-One Word Substitutes- Word Pairs

Reading

"Education Provides a Solid Foundation"- from Wings of Fire –An Autobiography of APJ Abdul K

UNIT-III (6)

Reading Skills:

"An Astrologer's Day" by R.K.Narayan
"On Saying Please" by A. G. Gardiner

UNIT-IV (6)

Writing Skills:

Precis Writing
Essay Writing
Report Writing

Text Books:

1."Work Book on English for Communication" (Unit 1, 2, 3, 4) by the faculty of English, Kakatiya Institute of Technology and Science, Warangal

Reference Books:

1. Harper Collins, "Cobuild English Grammar" Third Edition, *Harper Collins Publishers Ltd.*
2. Sanjay Kumar & Pushp Lata, "Communication Skills" Second Revised Edition,2015, *Oxford University Press Ltd.*
3. R.K. Narayan," Malgudi Days" Indian Thought Publications,1943
4. APJ Abdul Kalam, "Wings of Fire" An Autobiography, Universities Press,1999
5. Mahatma Gandhi," The Story of My Experiments with Truth" An Autobiography, Global Vision Press,2013.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: Speak and write with accuracy a variety of sentence structures.
CO2: Build vocabulary through contextual clues from the text
CO3: Apply appropriate reading strategies to summarize and paraphrase the text by understanding the main ideas.
CO4: Write well organized paragraphs with accuracy contextually suitable vocabulary.

Course Articulation Matrix (CAM): U18MH104 ENGLISH FOR COMMUNICATION

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18MH104.1	-	1	-	1	1	1	1	1	1	1	2	1	1	-
CO2	U18MH104.2	1	1	-	--	--	--	1	1	3	1	--	1	1	-
CO3	U18MH104.3	-	1	-	--	--	--	--	1	2	1	2	1	1	-
CO4	U18MH104.4	-	1	1	1	--	--	1	1	3	1	1	1	1	-
U18MH104/204		**1**	**1**	**1**	**1**	**1**	**1**	**1**	1	**2.2**	1	**1.7**	1	1	-

ENGLISH LANGUAGE LAB

Listening Skills (3x2):

Listening to Sounds, Stress and Intonation

Listening for Information

Life Skills (3x2)

Etiquette

Goal Setting

Body Language

Speaking Skills & Writing Skills (6x2)

a. ***Presentaton Technique :***

Self Introduction

JAM (Just A Minute)

Group Discussion

Debate

Description

Interview skills

b. ***Assignment:***

Students have to present PPT on the topics given in the English Laboratory

Writing Skills

a) planning
b) coherence
c) accuracy

U18EE105 BASIC ELECTRICAL ENGINEERING

Class: B.Tech. I- Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1: network elements and analysis of simple electrical DC circuits

LO2: DC network theorems

LO3: fundamentals of 1- and 3-AC circuits

LO4: working principles and applications of DC & AC machines, concepts of earthing, fuses, lighting sources, MCB & batteries

UNIT – I (9+3)

DC circuits: Introduction, network elements, Ohm's law, electric power, electrical energy, Kirchhoff's laws, resistances in series-voltage divider rule, resistances in parallel-current divider rule, series & parallel circuits, mesh analysis, nodal analysis (T & π networks only)

UNIT – II (9+3)

DC network theorems (Independent sources only): Introduction, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem (T and π networks only)

UNIT – III (9+3)

1- AC circuits: Phasor representation of sinusoidal quantities, average and R.M.S values of sinusoidal wave form, AC through resistor, inductor, capacitor and series R-L-C circuit

3-f AC circuits: Production of 3-f voltages, voltage & current relationships of line and phase values for balanced star and delta connections

UNIT – IV (9+3)

Introduction to electrical machines (Qualitative treatment): Construction, principle of operation &applications of 1-f transformer, 3-f induction motor, 1-f induction motor and DC motor

Electrical earthing, fuses & lighting sources: Basic concepts of earthing, fuses and lighting sources-incandescent, fluorescent, CFL & LED lamps, Miniature Circuit Breaker(MCB), types of batteries

Text Book:

1. K. Uma Rao, *Basic Electrical Engineering*, New Delhi: Pearson Education, 2011.

Reference Books:

1. B.L.Thereja, A.K.Thereja, *Electrical Technology Vol. I & II*,23rd ed., New Delhi: S.Chand& Company Ltd, 2005.
2. Edward Hughes, *Electrical & Electronics Technology*, 10th ed., New Delhi: Pearson Education,2010.
3. D. P. Kothari and I. J. Nagrath, *Basic Electrical Engineering*, New Delhi: Tata McGraw Hill Education (India) Pvt. Ltd., 2010.
4. Chakravarthy A, Sudhipanath and Chandan Kumar, *Basic Electrical Engineering*, Tata McGraw Hill Education (India) Pvt. Ltd., 2009.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Outcomes (COs):

On completion of the course, the students will be able to...

CO1: determine voltage, current & power in electrical circuits using mesh & nodal analysis

CO2: apply suitable DC network theorems to analyze T & π networks

CO3: find current, voltage & power in 1-phase& 3 -phase AC circuits

CO4: explain construction, working principle & applications of electrical machines; electrical earthing, fuses, lighting sources, MCB & batteries

Course Articulation Matrix: U18EE105 BASIC ELECTRICAL ENGINEERING

CO		PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18EE105.1	2	1	-	-	-	-	-	1	-	1	-	1	1	1
CO2	U18EE105.2	2	2	-	-	-	-	-	1	-	1	-	1	1	1
CO3	U18EE105.3	3	3	1	1	1	-	1	1	-	1	-	1	1	1
CO4	U18EE105.4	3	3	1	1	1	1	1	1	-	1	-	1	1	1
U18EE105		**2.5**	**2.25**	**1**	**1**	**1**	**1**	**1**	1	-	1	-	1	**1**	**1**

U18EE106 BASIC ELECTRICAL ENGINEERING LABORATORY

Class: B.Tech. I-Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):
This laboratory course will develop students' knowledge in/on
LO1: domestic wiring & basic electrical installations
LO2: network elements and analysis of electrical circuits
LO3: 1-phase and 3-phase AC circuits
LO4: measurement of illumination

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's Laws
2. Verification of voltage divider rule and current divider rule
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem
5. Verification of Superposition theorem
6. Verification of Maximum power transfer theorem
7. Determination of internal parameters of a choke coil
8. Impedance calculations and phasor representation of R-L series circuit
9. Impedance calculations and phasor representation of R-C series circuit
10. Load test on 1-phase transformer
11. Voltage and current relationships between line & phase quantities for balanced 3-phase star & delta connections
12. Measurement of illumination for various lighting sources

** DEMONSTRATION OF ELECTRICAL INSTALLATIONS **
[Wires, Cables, Fuse, MSB, Batteries, Earthing]

Text Books:

1. *Basic Electrical Engineering Laboratory Manual*, Department of EEE, KITSW

Course Outcomes (COs):
On completion of this course, the students will be able to…
CO1: handle basic electrical equipment
CO2: understand the concepts of network elements and theorems
CO3: understand fundamental concepts of 1-phase and 3-phase AC circuits
CO4: determine illumination of various lighting sources

Course Articulation Matrix (CAM): U18EE106 BASIC ELECTRICAL ENGINEERING LABORATORY

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18EE106.1	2	2	1	1	1	1	-	1	2	1	1	1	1	1
CO2	U18EE106.2	2	1	-	1	-	1	-	1	2	1	1	1	1	1
CO3	U18EE106.3	2	2	2	2	1	1	1	1	2	1	2	1	1	1
CO4	U18EE106.4	2	1	1	2	1	1	1	1	2	1	1	1	1	1
U18EE106		**2**	**1.5**	**1.33**	**1.5**	**1**	**1**	**1**	**1**	**2**	**1**	**1.25**	**1**	**1**	**1**

U18CS107 PROGRAMMING FOR PROBLEM SOLVING USING C LAB

Class: B.Tech. I- Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT) CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

***LO1**: operators and decision making statements*

***LO2:** loop techniques and array operations for problem solving*

***LO3:** string functions and modular programming approach for problem solving*

***LO4:** structures, unions, pointers and files*

LIST OF EXPERIMENTS

1. Programs using input output functions, operators (arithmetic, relational and conditional)
2. Programs using operators (bit-wise, logical, increment and decrement)
3. Programs using conditional control structures: if, if-else, nested if
4. Programs using else if ladder, switch and goto
5. Programs using loop control structures: while
6. Programs using loop control structures: do-while and for
7. Programs on one dimensional array and two dimensional arrays
8. Programs on string handling functions
9. Programs on different types of functions, parameter passing using call-by-value, call-by-reference, recursion and storage classes
10. Programs using structures, unions, pointers to arrays and pointers to strings
11. Programs using array of pointers and pointers to structures
12. File operations and file handling functions for sequential file

Laboratory Manual:

1. Programming in Problem solving C Laboratory Manual, Dept. of CSE, KITSW

Reference Books:

1. E.Balagurusamy, "Programming in ANSIC", *Tata McGraw Hill*, 6th Edn, ISBN-13: 978-1- 25 - 90046 -2, 2012
2. Kerninghan and Ritchie, "The C Programming Language", *Prentice Hall of India*, 2nd Edn., ISBN-13:007-6092003106, 1988
3. Yaswanth Kkanetkar, "Let Us C", *BPB Publications*, 13th Edn., ISBN-13: 9788183331630, 2012

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of the course, the students will be able to

CO1: *develop programs using operators and decision making statements*
CO2: *apply the loops and array operations for logical programming*
CO3: *implement string programs and apply modular programming techniques*
CO4: *develop programs using structures, unions, pointers and files*

Course Articulation Matrix (CAM): U18CS107 PROGRAMMING FOR PROBLEM SOLVING USING C LAB															
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	U18CS107.1	1	1	1	1	-	-	-	1	1	1	-	1	1	2
CO2	U18CS107.2	1	2	2	1	-	-	-	1	1	1	-	1	1	2
CO3	U18CS107.3	1	2	2	1	-	-	-	1	1	1	-	1	1	2
CO4	U18CS107.4	1	2	2	2	1	-	-	1	1	1	-	1	1	2
U18CS107		**1**	**1.75**	**1.75**	**1.25**	**1**	-	-	1	1	1	-	**1**	1	2

U18PH108 ENGINEERING PHYSICS LABORATORY

Class: B.Tech. I– Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge in/on...

LO1: determination of various properties like rigidity modulus, moment of inertia, acceleration due to gravity and other elastic properties from SHMs

LO2: determination of the wavelengths, diameters of thin wires, limit of resolution and optical activity with high degree of accuracy from interference, diffraction and polarization phenomena using conventional light

LO3: determination of the wavelengths, slit widths with high degree of accuracy from diffraction phenomena using laser light

LO4: determination of optical fiber characteristics

LIST OF EXPERIMENTS

1. Determination of (a) rigidity modulus of a given wire and (b) moment of inertia of a ring using torsional pendulum
2. Acceleration due to gravity (g) by compound pendulum
3. Determination of force constant of a spiral spring using static method
4. Determination of wavelengths in mercury light using diffraction Grating- Normal incidence method
5. Determination of wavelength of He-Ne laser using reflection grating
6. Resolving power of a telescope
7. Determination of slit width using He-Ne laser
8. Dispersive power of a prism using spectrometer
9. Determination of wavelength of a monochromatic light using Newton's rings
10. Determination of thickness of thin wire using wedge method
11. Determination of specific rotation of sugar solution using Polarimeter (Saccharimeter)
12. Numerical aperture of an optical fiber

Laboratory Manual:

1. *Manual for Engineering Physics Laboratory* prepared by the Department of Physical Sciences/Physics, KITSW

Reference Book:

1. C.V. Madhusudhana Rao and V. Vasanth Kumar, *Engineering Lab Manual*, Scitech publications India Pvt. Ltd, 3/e, 2012.

Course Learning Outcomes (COs):

On completion of the course, the students will be able to

CO1: determine precisely the values of elastic properties, moments of inertia, acceleration due to gravity, etc

CO2: assess precise measurements of wavelengths, diameter of thin wires, limit of resolution and optical rotation from light phenomena (Interference, diffraction and polarization)

CO3: evaluate the wavelengths, slit widths from diffraction patterns using laser light

CO4: estimate the numerical aperture, acceptance angle and fiber losses of optical fibers

Course Articulation Matrix (CAM): U18PH108 ENGINEERING PHYSICS LABORATORY															
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18PH108.1	1	-	-	3	-	-	2	1	2	1	-	1	1	1
CO2	U18PH108.2	1	-	-	3	-	-	2	1	2	1	-	1	1	1
CO3	U18PH108.3	1	-	-	3	-	-	2	1	2	1	-	1	1	1
CO4	U18PH108.4	2	-	1	3	-	-	2	1	2	1	-	1	1	1
U18PH108		1.25	-	1	3	-	-	2	1	2	1	-	1	1	1

U18ME109 WORKSHOP PRACTICE

Class: B. Tech. I- Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Examination :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: tools and development of joints in carpentry
LO2: mould cavity using single and two piece pattern
LO3: tools and development of joints using fitting and plumbing
LO4: principle and operation of arc welding, gas welding and soldering

LIST OF EXPERIMENTS

Carpentry:
1. Prepare a cross half lap joint
2. Prepare a half lap dovetail joint
3. Prepare mortise and tenon joint

Foundry:
1. Prepare a sand mould using single piece pattern-bracket
2. Prepare a sand mould using two piece pattern-dumbbell

Fitting:
1. Prepare a square fit.
2. Prepare a half round fit.

Plumbing:
1. Prepare a PVC Pipe joint using elbows & tee
2. Prepare a PVC Pipe joint using union & coupling

Welding:
1. Prepare a single V – Butt Joint using Arc welding
2. Preparation of pipe joint using gas welding
3. Soldering and de-soldering of Resistor in PCB.

Laboratory Manual:
Workshop Practice Laboratory Manual & Record book - by the faculty of the department of Mechanical Engineering

Videos on Workshop Practice Lab experiments:
Videos on conduction of workshop practice experiments - by the faculty of the department of Mechanical Engineering

Reference:
1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy., *Elements of Workshop Technology*, Media Promoters and publishers Pvt. Ltd, India, Vol-I-2008 &Vol-II-2010.

Course Learning Outcomes (COs):
On completion of the course, the student will be able to...
CO1: identify and apply suitable tools to produce cross, half lap, mortise & tenon joints in carpentry trade
CO2: apply basic gating system and produce a mould cavity for single & split pattern
CO3: identify and apply suitable tools to make various joints in fitting & plumbing trade
CO4: adapt suitable welding process and build joints in welding trade

Course Articulation Matrix (CAM): U18ME109/ U18ME209 WORKSHOP PRACTICE

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18ME109.1/ U18ME209.1	2	1	1	-	-	1	-	1	2	1	-	1	1	1
CO2	U18ME109.1/ U18ME209.1	2	1	1	-	-	1	-	1	2	1	-	1	1	1
CO3	U18ME109.1/ U18ME209.1	2	1	1	-	-	1	-	1	2	1	-	1	1	1
CO4	U18ME109.1/ U18ME209.1	2	1	1	-	-	1	-	1	2	1	-	1	1	1
U18ME109/ U18ME209		2	1	1	-	-	1	-	1	2	1	-	1	1	1

U18EA110 EAA: SPORTS/YOGA/NSS

Class: B. Tech. I -Semester
B. Tech. II -Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme :

L	T	P	C
-	-	2	-

Examination Scheme :

Continuous Internal Evaluation	100 Marks
End Semester Examination	-

I. SPORTS

Course Learning objectives (LOs):
This course will be develop student's knowledge in / on.....

LO1 : perform and engage in a variety of physical activities
LO2 : develop and maintain physical health and fitness through regular participation in physical activities
LO3 : demonstrate positive self esteem, mental health and physiological balance through body awareness and control
LO4 : exhibit the spirit of fair play, team work and sportsmenship

Activities related to:

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning objectives (LOs):
This course will be develop student's knowledge in / on.....

LO1: arouse the social consciousness of the students
LO2 : provide them with opportunity to work with people in villages and slums
LO3 : expose them to the reality of life
LO4 : bring about a change in their social perceptions
LO5 : develop competence required for responsibility sharing and team work

List of Activities:

1. Shramadanam
2. Tree Plantation
3. General Medical camps in Villages
4. Awareness on Eye Donation
5. Awareness on "Child Labour and Child Marriages"
6. Awareness programs on " Literacy, Good Health Practices, etc."
7. Safe Riding Program
8. Awareness program on "RTI Act"
9. Awareness on Blood Donation

Course Learning Outcomes (COs):
On completion of the course, the student will be able to..

CO1: develop his/her personally through community service rendered
CO2 : apply their education to find solutions to individual and community problems
CO3 : acquire capacity to meet emergencies and natural disasters
CO4 : acquire a democratic attitude, leadership qualities and practice national integration

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION (*Applicable from B21 batch*)
II-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM
BRANCH : B.Tech. – ME / CSE / CSN / IT / CSIoT (Stream – I) **[5Th+2P+2MC]**

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH201	Engineering Mathematics – II	3	1	-	4	10	30	40	60	100
2	ESC	U18CS202R1	Data Structures through C	3	-	-	3	10	30	40	60	100
3	BSC	U18CH203	Engineering Chemistry	3	1	-	4	10	30	40	60	100
4	ESC	U18ME204	Engineering Drawing	2	-	4	4	10	30	40	60	100
5	ESC	U18CE205	Engineering Mechanics	3	1	-	4	10	30	40	60	100
6	ESC	U18CS207R1	Data Structures through C Laboratory	-	-	2	1	40	-	40	60	100
7	BSC	U18CH208	Engineering Chemistry Laboratory	_	_	2	1	40	-	40	60	100
8	MC	U18CH209	Environmental Studies*	2	_	-	-	10	30	40	60	100
9	MC	U18EA210	EAA* : Sports / Yoga / NSS*	-	-	2	-	100	-	100	-	100
Total:				16	3	10	21	240	180	420	480	900

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] EAA: Extra Academic Activity * indicates mandatory non-credit course

Total Contact Periods/Week: 29 Total Credits: 21
Stream-I: ME, CSE, IT, CSN,CSE(IOT) Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)

U18MH201 ENGINEERING MATHEMATICS- II

Class: B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT) CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in

LO1: various methods of solving system of linear equations and eigen value problems

LO2: double integral, triple integral and their applications.

LO3: vector differential calculus with few engineering applications.

LO4*: integration of vector valued functions with few engineering applications*

UNIT-I (9+3)

Matrices: Elementary transformations on a matrix. To find inverse of a matrix using elementary transformations- Rank of matrix, Normal form of a matrix, Solution of system of homogenous and non homogeneous linear equations, Linear dependence and independence of vectors.

Eigen values and Eigen vectors of a matrix- Cayley Hamilton's theorem, Reduction of a matrix to diagonal form, Reduction of a quadratic form to canonical form.

UNIT-II (9+3)

Multiple Integrals and Applications: Double integral, change of order of integration, Double integration in polar coordinates, Triple integrals, Applications: Area enclosed by plane curves, Volumes of solids, Calculation of mass, Center of gravity, Moment of Inertia of plane lamina.

Beta and Gama functions and their relations. Evaluation of improper integrals in terms of Beta and Gamma functions.

UNIT-III (9+3)

Vector Differential Calculus: Vector functions - Derivative of a vector function of a scalar variable, Velocity and acceleration, Curves in Space, Tangent, Principal normal, Binormal, Curvature, Torsion of a given curve and Frenet -Serret Formulae.

Scalar and vector point functions, Vector operators – Gradient of a scalar field, Directional derivative, angle between two surfaces.

Divergence of a vector field, Curl of a vector field and their physical interpretations. Irrotational fields & Solenoidal fields. to find scalar potential of a conservative vector field.

UNIT-IV (9+3)

Vector Integration: Integration of vector valued functions of a scalar variable, Application to find velocity and displacement of a particle. Line integral of scalar point and vector point functions, Applications: Work done by a force, Circulation; Surface Integral & Volume integral. Green's theorem in plane, and area of a plane region using Green's theorem. Stokes theorem & Gauss divergence theorems (without proof

Text Books:

[1] Grewal, B.S., Higher Engineering Mathematics, 43/e, Delhi, *Khanna Publishers* ,2014.

Reference Books:

[1] Kreyszig E, Advanced Engineering Mathematics,9th edition, Inc, U.K, John wiely *& sons*, 2013.

[2] Spiegel M., Vector Analysis -Schaum Series", McGraw Hill

[3] S.S. Sastry, Engineering Mathematics 3/e, Vol.II, Prentice Hall of India,2014

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: demonstrate matrix theory in solving system of linear equations and Eigen value problems
CO2: apply basic concepts of multiple integrals in evaluating physical quantities of real life engineering problems
CO3: apply differential operators on vector and scalar point functions and their few applications in the field of engineering
CO4: solve line, surface, volume integrals and corelate these with applications of Green, Stoke and Gauss divergence theorems

Course Articulation Matrix (CAM): U18 MH201 ENGINEERING MATHEMATICS- II

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**U18MH201.1**	3	2	1	--	--	--	--	1	--	1	--	1	1	1
CO2	**U18MH201.2**	3	3	2	--	--	--	--	1	--	1	--	1	1	1
CO3	**U18MH201.3**	3	2	2	--	--	--	--	1	--	1	--	1	1	1
CO4	**U18MH201.4**	3	2	2	--	--	--	--	1	--	1	--	1	-	-
U18MH201		**3**	**2.25**	**1.75**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**	**1**	**1**	**1**

U18CS202R1 DATA STRUCTURES THROUGH C

Class: B. Tech II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT) CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme :			
L	T	P	C
3	-	-	3

Examination Scheme:	
Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on

LO1: fundamentals data structures and their implementation with arrays
LO2: representation of data structures using stacks and various forms of queues
LO3: representing the data using linked lists
LO4: various sorting techniques on the given data and representing different hashing techniques

UNIT – I (9+3)

Introduction to Data Structures: Basic terminology, classification of data structures, operations on data structures, time and space complexity

Arrays: Operations on arrays-traversing an array, inserting an element in an array, deleting an element from an array, searching an element using linear search & binary search and their time complexities; sparse matrix representation.

Dynamic Memory Allocation: Memory allocation functions, dynamic memory allocation for single and two dimensional arrays

UNIT – II (9+3)

Stacks: Introduction to stacks, array representation of stacks, operations on a stack–push and pop; Multiple stacks, applications of stacks-recursion, fibonacci series, tower of hanoi, evaluation of expressions (infix to postfix conversion, evaluation of postfix expression)

Queues: Introduction to queues, array representation of queues, circular queues, deques, priority queues

UNIT - III (9+3)

Linked Lists: Basic terminologies, linked list versus arrays, memory allocation and de-allocation for a linked list, singly linked list with header, circular linked lists with header, doubly linked lists with header, circular doubly linked lists with header (linked list operations: traversing, searching, inserting, deleting, reversing, concatenation); XOR-Linked List, skip list, representing stack and queue using linked list. Time Complexities of the above linked list operations.

UNIT – IV (9+3)

Sorting Techniques: bubble sort, selection sort, insertion sort, shell sort and radix sort; time complexities of above sorting techniques.

Hashing: Hashing techniques, collision resolution techniques, closed hashing, open hashing, comparison of collision resolution techniques

Textbook:

1. Debasis Samanta, "Classic Data Structures", *Prentice Hall India*, 2nd Edn., ISBN-13: 978-81 203- 3731-2, 2009.

Reference Books:

1. Reema Thareja, "Data Structures Using C", *Oxford University Press*, 2nd Edn., ISBN-13: 978-0 19-809930-7, 2014.
2. E Balagurusamy, "Data Structure Using C", *McGraw Hill Education*, 1st Edn., ISBN-13: 978 125- 902-9547, 2017.
3. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", *Cengage Learning*, 2nd Edn., ISBN-13: 9788131503140, 2007.

Reference Books:

[1] Reema Thareja, "Data Structures Using C", Oxford University Press, 2nd Edn., ISBN-13: 978-0-19-809930-7, 2014.
[2] E Balagurusamy, "Data Structure Using C",*McGraw Hill Education*, 1st Edn.,ISBN-13: 978-125-902-9547, 2017.
[3] Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Cengage Learning, 2nd Edn., ISBN-13: 9788131503140, 2007.

Course Research Papers (CRP): Research papers (Indexed journal/conference papers) relevant to the course content by the course faculty in CourseWeb page. Students have to write a two-page summary on CRP and submit as part of special assignment.

Course Patents (CP): Patents relevant to the course content will be posted by the course faculty in Course Web page. Students have to write a two-page summary on CP and submit as part of special assignment.

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to

CO1: implement programs using static & dynamic arrays for performing different manipulations on homogeneous data
CO2: apply the linear data structures such as stacks and queues in manipulating the data with LIFO or FIFO order.
CO3: organize and retrieve the data through various linked list representations in non-contiguous memory storing
CO4: apply different sorting techniques on unsorted data and able to store the data using hashing techniques to retrieve the data very effectively

Course Articulation Matrix (CAM): U18CS202R1 DATA STRUCTURES THROUGH C

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CS202.1	2	2	2	2	1	1	-	1	1	1	-	1	1	2
CO2	U18CS202.2	2	2	2	2	1	1	-	1	1	1	-	1	1	2
CO3	U18CS202.3	2	2	2	2	1	1	-	1	1	1	-	1	1	2
CO4	U18CS202.4	2	2	2	2	1	1	-	1	1	1	-	1	1	2
U18CS202		2	2	2	2	1	1	-	1	1	1	-	1	1	2

U18CH203 ENGINEERING CHEMISTRY

Class: B.Tech. I–Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: fundamental concepts of electrochemistry, electrochemical cells

LO2 : corrosion science, phase rule application to various equilibria, I/C engine fuels.

LO3 : basic spectroscopic techniques of chemical analysis, water analysis and treatment

LO4: basic concepts of organic chemistry, polymerization reactions, versatile applications of polymers

UNIT-I (9+3)

Electrochemistry: Specific conductance ,equivalent conductance, effect of dilution, Conductometric titrations -acid base titrations, their advantages over conventional methods, Electrode potential, Nernst equation, Electrochemical series and its applications, Calomel electrode, Determination of pH using quinhydrone electrode, hydrogen electrode, Potentiometric titrations (acid base titrations), Commercial cells- Lead-acid storage cell , Fuel cells-Hydrogen-oxygen fuel cell.

UNIT-II (9+3)

Corrosion: Introduction-corrosion by pure chemical reaction (dry corrosion), Electrochemical corrosion(wet corrosion), Factors influencing corrosion, Prevention methods of corrosion - cathodic protection, hot dipping methods(galvanizing, tinning), cladding, electroplating.

Phase rule: Description of the terms-phase, component and degrees of freedom, Gibbs phase rule equation, Application of the phase rule to one-component system (water system), two-component system (silver-lead system), Pattinson's process for desilverisation of lead.

Fuels: Characteristics of fuels for internal combustion engines, Knocking , Octane number, Cetane number, Compressed natural gas(CNG), Power alcohol.

UNIT-III (9+3)

Introduction to Methods of Chemical Analysis: Introduction to spectroscopy- Microwave spectra- theory, Application of microwave spectra in the determination of bond length of a diatomic molecule; Infra-red spectra, theory, Applications- calculation of force constant and identification of functional groups in organic compounds, Lambert-Beer's law and its applications.

Water Analysis and Treatment: Hardness of water, Determination of hardness of water by using EDTA, Determination of alkalinity, Determination of fluoride by spectrophotometry, Determination of dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, Softening of water by ion-exchange process, Desalination of brackish water- Reverse osmosis, Electrodialysis

UNIT-IV (9+3)

Organic Chemistry: Fission of a covalent bond, Types of electronic effects- inductive effect, mesomeric effect , Reaction intermediates, their stabilities, Types of reagents- electrophilic, nucleophilic reagents, Mechanisms of nucleophilic substitution($SN^1$and SN^2) , addition (electrophilic, nucleophilic and free radical) reactions .

Polymers: Introduction -Types of polymerization reactions-addition, condensation , Mechanism of free radical, cationic and anionic addition polymerization, Thermo-setting and thermo plastic resins, Conducting polymers and their applications.

Text Books:

1. Jain and Jain, *Engineering Chemistry*, 16th ed. Dhanpat Rai Publishing Company, 2012.

Reference Books:

1. J.C.Kuriacose and J.Rajaram, *Chemistry in Engineering and Technology(vol.I & vol.II)*, Tata Mc. Graw-Hills Education Pvt. Ltd., 2010.
2. Shashi Chawla, *Text book of Engineering Chemistry*, 3rd ed., Dhanpat Rai Publishers, 2003.
3. S.S. Dara, S S. Umare, *A Text book of Engineering Chemistry*, 12th ed., S.Chand & Company Ltd., 2010.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(COs):

On completion of this course, students will be able to ...

CO1: discuss the concepts of electro chemistry and electrochemical cells

CO2: apply the materials in the field of engineering and phase rule in the study of material science, select suitable fuels for I/C engines.

CO3: determine molecular parameters using spectroscopic techniques and quality parameters of water sample, discuss softening methods of hard water.

CO4: appraise the concepts of organic chemistry, polymerization reactions and applications of polymers.

Course Articulation Matrix (CAM): U18CH203 ENGINEERING CHEMISTRY

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CH203.1	2	2	1	1	1	-	1	1	1	1	-	1	1	1
CO2	U18CH203.2	2	1	2	2	-	1	1	1	2	1	-	1	2	1
CO3	U18CH203.3	2	1	1	2	-	1	-	1	2	1	-	1	1	1
CO4	U18CH203.4	1	-	1	2	-	1	-	1	2	1	-	1	2	1
U18CH203		1.75	1.33	1.25	1.75	1.00	1	1	1	1.75	1	-	1	1.5	1

U18ME204 ENGINEERING DRAWING

Class: B. Tech. I- Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
2	-	4	4

Examination Scheme:

Continuous Internal Evaluation	:	40 marks
End Semester Exam	:	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on...
LO1: projections of points and straight lines-I
LO2: projections of straight lines-II and planes
LO3: projections of solids and sections of solids
LO4: isometric and orthographic projections

UNIT – I (6+12)

Introduction: Importance of Engineering Drawing, instruments- uses; Layout of drawing sheets, Types of Lines, Lettering and dimensioning, Construction of regular polygons **Projection of Points**: Introduction to orthographic projections-Vertical Plane, Horizontal plane; Views-Front view, Top view and Side view; Projection of Points-different quadrants

Projection of Straight lines - I: Line parallel to both the planes, Line parallel to one plane and perpendicular to the other reference plane, Line parallel to one plane and inclined to the other reference plane

UNIT – II (6+12)

Projection of Straight Lines – II: Line- inclined to both the planes and Traces

Projection of Planes: Planes - Perpendicular and Oblique planes; Projections of planes - parallel to one of the reference planes, inclined to one of the reference plane and perpendicular to the other; Projections of oblique planes

UNIT – III (6+12)

Projection of Solids: Types-prisms, pyramids, cylinder and cone; Simple Positions-axis parallel to a reference plane and perpendicular to the other plane, axis parallel to one plane and inclined to other reference plane; axis inclined to both the reference planes

Sections of Solids: Types-prisms and pyramids; Section planes, Sectional views and true shape of a section

UNIT – IV (6+12)

Orthographic projections: Conversion of isometric views into orthographic views

Isometric Projections: Isometric axis, Isometric Planes, Isometric View, Isometric projection, Construction of isometric view from orthographic views

AutoCAD: Introduction to AutoCAD, DRAW tools, MODIFY tools, TEXT, DIMENSION, PROPERTIES tool bar, Standard tool bars, LAYERS; drawing of orthographic and isometric projections in AutoCAD.

Textbook:

[1] Bhatt N.D., *Elementary Engineering Drawing*, Anand: Charotar Publishing House India, 2017.

Reference Books:

[1] Dhananjay A Jolhe, *Engineering Drawing*, Tata Mc Graw- hill, 2008.

[2] Venugopal K., *Engineering Graphics with Auto CAD*, Hyderabad: New Age International Publishers Ltd., 2012.

[3] W J Luzadder and J M Duff, *Fundamentals of Engineering Drawing*, Prentice-Hall of India, 1995.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Outcomes (COs):

On completion of this course, students will be able to...

CO1: develop projections of points & straight lines-I.

CO2: develop projections of straight lines-II & planes.

CO3: construct projection of solids and analyze internal details of an object through sectional views.

CO4: construct 2D orthographic views from 3D isometric views and develop 3D isometric views from 2D views.

Course Articulation Matrix (CAM): U18ME204 ENGINEERING DRAWING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18ME204.1	2	1	1	-	-	-	-	1	-	1	-	1	-	-
CO2	U18ME204.2	2	1	1	-	-	-	-	1	-	1	-	1	-	-
CO3	U18ME204.3	2	1	1	-	-	-	-	1	-	1	-	1	2	2
CO4	U18ME204.4	2	1	1	-	1	-	-	1	-	1	-	1	2	2
U18ME204		**2**	**1**	**1**	**-**	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**1**	**2**	**2**

U18CE205 ENGINEERING MECHANICS

Class: B.Tech. I-Semester
B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in...

LO1: force systems and their applications

LO2: concepts and application of friction, analysis of plane trusses

LO3: centroid and moment of inertia of geometric and composite areas

LO4: dynamics of a particle and its applications

UNIT – I (9+3)

Laws of Mechanics: Parallelogram law of forces, triangle law of forces, Newton's law of gravitation, law of superposition and transmissibility of forces.

Force Systems: Types of forces, co-planar, concurrent and parallel forces, moment and couple, free body diagram, resultant of force systems, resolution of forces, composition of forces, equilibrium equations of forces, Lami's theorem, Varignon's theorem, moment equilibrium equations, types of supports, beams and loadings, statically determinate structures, resultant and equilibrium of general force system.

UNIT –II (9+3)

Friction: Introduction, classification, laws of friction, coefficient of friction, angle of friction, ladder friction and wedge friction.

Plane Trusses: Rigid truss, stability and determinacy conditions, basic assumptions for a perfect truss, analysis of trusses by method of joints and method of sections of a cantilever and simply supported statically determinate pin-jointed trusses.

UNIT– III (9+3)

Centroid: Centroid of one dimensional figures, centroid of simple figures from first principles, centroid of composite sections.

Moment of Inertia: Moment of inertia of plane sections from first principles, theorems of moment of inertia – parallel axis theorem and perpendicular axis theorem, moment of inertia of standard sections and composite sections.

UNIT - IV (9+3)

Kinematics: Introduction to dynamics, rectilinear motion of a particle – displacement, velocity and acceleration, motion with uniform acceleration and motion with variable acceleration, curvilinear motion- rectangular components, components, acceleration of normal and tangential acceleration, projectile motion.

Kinetics: Rectilinear motion-equations of rectilinear motion, equations of dynamic equilibrium, D'Alembert's principle, curvilinear motion-equations of motion in rectangular components, tangential and normal components, equations of dynamic equilibrium, applications of work-energy, impulse –momentum principles of rectilinear motion and curvilinear motion.

Text Books:

1. Tayal A.K., *Engineering Mechanics: Statics and Dynamics*, 14th ed. New Delhi: Umesh Publishers, 2014.

Reference Books:

1. Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, *Engineering Mechanics in SI units*, 5th ed. New Delhi: McGraw Hill Education Pvt. Ltd., 2013.
2. Vijaya Kumar Reddy K., Suresh Kumar J. *Singer's, Engineering Mechanics Statics and Dynamics*, 3rd ed. (SI Units), 8th Reprint , New Delhi: BS Publications / BSP Books, 2014.
3. Bhavikatti S.S., *Engineering Mechanics*, 4th ed. New Delhi: New Age International, 2013 (reprint).
4. Basudeb Bhattacharyya, *Engineering Mechanics*, 9th ed. New Delhi: Oxford University Press, 2013.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the student will be able to...

CO1: articulate various force systems and their applications

CO2: *demonstrate concepts of friction and analyze plane trusses*

CO3: calculate centroid and moment of inertia of geometric and composite areas

CO4: analyze dynamics of a particle and its applications

Course Articulation Matrix (CAM): U18CE205 ENGINEERING MECHANICS

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CE205.1	1	2	-	-	-	-	-	1	-	1	-	1	2	1
CO2	U18CE205.2	1	2	-	-	-	-	-	1	-	1	-	1	2	1
CO3	U18CE205.3	1	2	-	-	-	-	-	1	-	1	-	1	2	1
CO4	U18CE205.4	1	2	-	-	-	-	-	1	-	1	-	1	2	1
U18CE205		**1**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**1**	**2**	**1**

U18CS207R1 DATA STRUCTURES THROGH 'C' LABORATORY

Class: B. Tech II-Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT) CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on

LO1: implementing array operations
LO2: organizing the data using stacks and queues
LO3: memory and data management using linked list
LO4: different types of sorting techniques

List of Experiments

Experiment-I

1. Program to implement initialization of array and perform traversal operations in both the directions
2. Program to implement searching operation on array using Linear Search
3. Program to display the count of occurrences of every number in an array

Experiment-II

4. Program to implement searching operation on array using Binary Search
5. Program to implement insertion operation on array
6. Program to implement deletion operations on array

Experiment-III

7. Program to represent and display the sparse matrix
8. Program to implement initialization of arrays and traversal operation with DMA
9. Program to implement matrix addition and subtraction with DMA

Experiment-IV

10. Program to implement matrix multiplication with DMA
11. Program to implement stack operations
12. Program to convert infix expression into postfix

Experiment-V

13. Program to evaluate given postfix expression
14. Program to define recursive function to solve tower of hanoi puzzle
15. Program to display the Fibonacci series with the help of recursive function
16. Program to implement MultiStack

Experiment-VI

17. Program to implement queue operations using arrays
18. Program to implement circular queue operations using arrays
19. Program to implement double ended queue operations using arrays

Experiment-VII

20. Program to implement priority queues
21. Program to create single linked list with header and implement its operations

Note:- Linked list Operations: i) traversing ii) inserting iii) deleting iv) searching v) reversing vi) concatination

Experiment-VIII

22. Program to create circular linked list with header and implement its operations
23. Program to create double linked list with header and implement its operations

Experiment-IX

24. Program to create circular double linked list with header and implement its operations
25. Program to implement stack operations using linked list
26. Program to implement queue operations using linked list

Experiment-X

27. Program to implement XOR linked list with insertion and traversal operations
28. Program to implement bubble sort

Experiment-XI

29. Program to implement selection sort
30. Program to implement insertion sort

Experiment-XII

31. Program to implement shell sort
32. Program to implement radix sort
33. Program to implement hash table.

Laboratory Manual:

[1] Data Structures through C' laboratory manual, *prepared by faculty of Dept. of Computer Science &Engineering.*

Reference Books:

[1] Debasis Samanta, "Classic Data Structures", *Prentice Hall India*, 2nd Edn., ISBN-13:978-81-203-3731- 2,2009.
[2] Reema Thareja, "Data Structures Using C", *Oxford University Press*, 2nd Edn., ISBN-13: 978-0-19-809930- 7, 2014.
[3] E.Balagurusamy, "Programming in ANSI-C", *Tata McGraw Hill*, 6th Edn., ISBN-13: 978-1-25-90046-2, 2012.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to

CO1: apply the concepts of static & dynamic arrays to performing different manipulations on homogeneous data
CO2: apply the linear data structures such as stacks and queues in manipulating the data with LIFO or FIFO order.
CO3: apply various linked list representations in non-contiguous memory allocation for organizing and retrieving the data effectively
CO4: apply different sorting techniques on unsorted data and able to store the data using hashing techniques to retrieve the data very effectively

Course Articulation Matrix (CAM): U18CS207R1 DATA STRUCTURES THROUGH C

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CS207.1	2	2	2	2	1	1	-	1	1	1	-	1	1	**2**
CO2	U18CS207.2	2	2	2	2	1	1	-	1	1	1	-	1	1	**2**
CO3	U18CS207.3	2	2	2	2	1	1	-	1	1	1	-	1	1	**2**
CO4	U18CS207.4	2	2	2	2	1	1	-	1	1	1	-	1	1	**2**
U18CS207		2	2	2	2	1	1	-	1	1	1	-	1	1	**2**

U18CH208 ENGINEERING CHEMISTRY LABORATORY

Class: B.Tech. I -Semester
B.Tech. II -Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):

This course will develop students knowledge in /on..

LO1: water analysis techniques
LO2: determination of metals from their ores, concepts of adsorption
LO3: instrumentation methods of chemical analysis
LO4: saponification/acid value of an oil

LIST OF EXPERIMENTS

1. Determination of alkalinity of test sample of water
2. Estimation of available chlorine in test sample of bleaching powder
3. Determination of hardness of water by using complexometric method
4. Determination of calcium in lime stone / dolomite
5. Estimation of cupric ions in the test solution
6. Adsorption of an acid on charcoal -applicability of adsorption isotherm
7. Synthesis of a polymer
8. Conductometric titrations
9. Potentiometric titrations
10. Colorimetric analysis-verification of Lambert-Beer's law
11. Estimation of metal ion using ion-exchange resin
12. Determination of saponification / acid value of an oil

Laboratory Manual:

1. *Manual for Engineering Chemistry Laboratory* prepared by the Department of Physical Sciences /Chemistry, KITSW

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: determine water quality parameters - alkalinity, hardness
CO2: assess metals present in their ores, apply Freundlich adsorption isotherm
CO3: handle analytical instruments for chemical analysis
CO4: measure saponification /acid value of an oil

Course Articulation Matrix (CAM): U18CH208 ENGINEERING CHEMISTRY LABORATORY															
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CH208.1	2	-	1	3	-	1	2	1	2	1	-	1	1	-
CO2	U18CH208.2	2	-	1	3	-	-	2	1	2	1	-	1	1	-
CO3	U18CH208.3	2	-	1	3	-	-	3	1	2	1	-	1	1	1
CO4	U18CH208.4	2	-	1	3	-	-	1	1	2	1	-	1	1	1
U18CH208		2	-	1	3	-	1	2	1	2	1	-	1	1	1

U18CH209 ENVIRONMENTAL STUDIES

Class: B.Tech. I -Semester
B.Tech. II -Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning objectives (LOs):
This course will develop students' knowledge in/on...
LO1: *necessity to use natural resources more equitably*
LO2 : *concepts of ecosystem and the importance of biodiversity conservation*
LO3 : *causes, effects and control measures of various environmental issues*
LO4 : *issues involved in enforcement of environmental legislation*

UNIT-I(6)

Introduction - The multidisciplinary nature of environmental studies - definition, scope and importance.

Natural Resources: Forest Resources - Use and over–exploitation of forests, deforestation, timber extraction, mining, dams - their effects on forests and tribal people; **Water Resources** - Use and over-utilization of surface and ground water, floods, drought, conflicts over water; **Mineral Resources** - Environmental effects of extracting and using mineral resources; **Agricultural Land** - Land as a resource, land degradation, soil erosion and desertification; **Food Resources** - World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging and salinity; **Energy Resources** - Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II(6)

Ecosystem and Biodiversity: Ecosystem - Concepts of an ecosystem, food chain, food webs, ecological pyramids, energy flow in the ecosystem and ecological succession;

Biodiversity and its Conservation – Introduction, definition, genetic, species and ecosystem diversity, value of biodiversity, biodiversity in India, hot spots of biodiversity, man-wildlife conflicts, endangered and endemic species of India, in-situ and ex-situ conservation.

UNIT-III(6)

Environmental Pollution: Global climatic change, green house gases, effects of global warming, ozone layer depletion; International conventions/protocols - Earth summit, Kyoto protocol and Montreal protocol; causes and effects of air, water, soil, marine and noise pollution with case studies; solid and hazardous waste management, effects of urban industrial and nuclear waste; natural disaster management - flood, earthquake, cyclone and landslides.

UNIT-IV(6)

Social Issues and the Environment: **Role of Individual and Society** - Role of individual in prevention of pollution, water conservation, Rain water harvesting and watershed management; **Environmental Protection / Control Acts** - Air (Prevention and control of Pollution) Act- 1981, water (Prevention and Control of Pollution) Act-1974, water Pollution Cess Act-1977, Forest conservation Act (1980 and 1992), wildlife Protection Act 1972 and environment protection Act 1986, issues involved in enforcement of environmental legislations; **Human Population and Environment** - Population growth, family welfare programmes, women and child welfare programmes, role of information technology in environment and human health.

Text Book:

1. Erach Bharucha, *Text Book of Environmental Studies for Under Graduate Courses,* 2nd ed . Universities Press (India) Pvt. Ltd, 2013.

Reference Books:

1. Y. Anjaneyulu, *Introduction to Environmental Science* , B.S. Publications, 2004.
2. Gilbert M. Masters, *Introduction to Environmental Engineering & Science* , 3 rd ed. Prentice Hall of India 1991.
3. Anubha Kaushik, C.P. Kaushik, *Environmental Studies*, 4th ed. New Age International Publishers, 2014.
4. R.Rajagopalan, *Environmental Studies from crisis to cure, Oxford University Press*, 2nd ed. 2011.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary of CRP and submit it as part of a special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty on the CourseWeb page. Students have to write a two-page summary on CP and submit it as part of a special assignment.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(COs):

On completion of this Course, the student will be able to...

CO1 : investigate any environmental issue using an interdisciplinary framework

CO2 : formulate an action plan for sustainable alternatives and conserving biodiversity that integrates science, humanist, social and economic perspective

CO3 : identify and explain the complexity of issues and processes which contribute to an environmental problem

CO4 : participate effectively in analysis and problem-solving through knowledge in environmental legislations

Course Articulation Matrix (CAM): U18CH209 ENVIRONMENTAL STUDIES

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CH209.1	2	1	2	1	-	2	1	1	1	1	-	1	1	-
CO2	U18CH209.2	-	-	2	-	-	1	2	1	1	1	-	1	1	-
CO3	U18CH209.3	1	2	1	-	-	1	1	1	1	1	-	1	1	2
CO4	U18CH209.4	-	-	1	-	-	1	2	1	1	1	-	1	1	2
U18CH209		1.5	1.5	1.5	1	-	1.25	1.5	1	1	1	-	1	1	2

U18EA210 EAA: SPORTS/YOGA/NSS

Class: B. Tech. I -Semester
B. Tech. II -Semester

Branch(s): ME, CSE, IT, CSN, CSE(IoT)
CE, EEE, ECE, ECI, CSE(AI&ML)

Teaching Scheme :

L	T	P	C
-	-	2	-

Examination Scheme :

Continuous Internal Evaluation	100 Marks
End Semester Examination	-

I. SPORTS

Course Learning objectives (LOs):
The objectives of the Sports is to..
LO1 : perform and engage in a variety of physical activities
LO2 : develop and maintain physical health and fitness through regular participation in physical activities
LO3 : demonstrate positive self esteem, mental health and physiological balance through body awareness and control
LO4 : exhibit the spirit of fair play, team work and sportsmenship

Activities related to:

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning objectives (LOs):
This course will be develop student's knowledge in / on.....
LO1: arouse the social consciousness of the students
LO2 : provide them with opportunity to work with people in villages and slums
LO3 : expose them to the reality of life
LO4 : bring about a change in their social perceptions
LO5 : develop competence required for responsibility sharing and team work

List of Activities:

1. Shramadanam
2. Tree Plantation
3. General Medical camps in Villages
4. Awareness on Eye Donation
5. Awareness on "Child Labour and Child Marriages"
6. Awareness programs on " Literacy, Good Health Practices, etc."
7. Safe Riding Program
8. Awareness program on "RTI Act"
9. Awareness on Blood Donation

Course Learning Outcomes (COs):
On completion of the course, the students will be able to ...
CO1: develop his/her personally through community service rendered
CO2 : apply their education to find solutions to individual and community problems
CO3 : acquire capacity to meet emergencies and natural disasters
CO4 : acquire a democratic attitude, leadership qualities and practice national integration

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
III-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[7Th+2P+1MC]

S.No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics – III	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH302	Professional English	_	_	2	1	100	-	100	-	100
3	PCC	U18CN303	Object Oriented Programming through JAVA	3	1	-	4	10	30	40	60	100
4	PCC	U18CN304R22	Operating Systems	3	-	-	3	10	30	40	60	100
5	PCC	U18CN305	Computer Organization and Architecture	3	-	-	3	10	30	40	60	100
6	PCC	U18CN306	Advanced Data Structures	3	-	-	3	10	30	40	60	100
7	ESC	U18EI309	Digital Electronics	3	-	-	3	10	30	40	60	100
8	PCC	U18CN310	Object Oriented Programming through Java Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN311R22	Advanced Data Structures Laboratory	_	_	2	1	40	-	40	60	100
10	MC	U18MH315	Essence of Indian Traditional Knowledge	2		-	-	10	30	40	60	100
			Total:	20	2	6	23	250	210	460	540	1000

[L= Lecture, T = Tutorials, P = Practicals & C = Credits]
Total Contact Periods/Week : 28 Total Credits: 23

Stream-I: ME, CSE, IT, CSN, CSE(IOT)

Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)

U18MH301 ENGINEERING MATHEMATICS-III

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: Laplace transform and its use to find the solutions of certain initial and boundary value problems occur in engineering

LO2: Fourier series and its importance.

LO3: functions of complex variables and the property of analyticity of a function of complex variable and their applications.

LO4: integration of a function of complex variable, and evaluation of certain real integrals using complex analysis.

UNIT-I (9+3)

Laplace Transforms: Integral transforms, Kernel of a transform, Laplace transform of a function, Inverse Transform-Existence and uniqueness of Laplace Transforms, S- plane and region of convergence (ROC),Laplace Transform of some commonly used signals-Dirac-delta(Impulse) function$[\delta(t)]$, step$[u(t)]$,ramp $[tu(t)]$,parabolic $[t^2u(t)]$,real exponential $[e^{at}u(t)]$,complex exponential$[e^{j\Omega t}u(t)]$,sine and cosine functions, damped sine and cosine functions, hyperbolic sine and cosine functions, damped hyperbolic sine and cosine functions, rectangular pulse and triangle. Properties of Laplace Transforms- Linearity, First shifting theorem (Frequency shift property), Laplace transforms of derivatives and integrals, time scaling property, time reversal property, Laplace Transform of Heaviside unit step function, Second shifting theorem (time shift property), Initial value and final value theorems, Laplace transform of periodic functions- Convolution theorem.

Operational Calculus: Transfer functions, Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace Transforms. Application of Laplace transforms to the first order and second order system subjected to impulse, step, periodic, rectangular, square, ramp, triangular and sinusoidal functions.

UNIT-II (9+3)

Fourier Series: Periodic functions, orthogonal and ortho normal functions and systems of orthogonal functions, representation of a function as Trigonometric Fourier series (FS) in a range of length 2π, Euler formulae, Conditions for the existence of Fourier series (Dirichlet's conditions), FS for typical wave forms-square wave, pulse train, impulse train(comb function), periodic rectangular wave, triangle, saw tooth, half wave rectified signal, full wave rectified signal, plotting FS coefficients - line spectrum (magnitude and Phase spectra), Fourier series on an arbitrary period, effects of symmetry of function on FS coefficients, half range series – half range cosine and sine series expansions, exponential FS.

UNIT-III (9+3)

Complex Variables: Functions of complex variables, Limit, Continuity, Differentiability, Analytic Functions, Cauchy-Riemann Equations in Cartesian and Polar coordinates. Elementary functions, Harmonic Functions, Construction of Analytic functions. Applications to find velocity potential and stream function of a flow. Conformal mapping and bilinear transformation.

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, integral of a non analytic function, dependence on path of integration, *ML*-Inequality, Cauchy's integral theorem, Cauchy's integral formula, series expansion of complex functions: Taylor's series and Laurent's series, zeros and singularities, residues, Residue Theorem- Applications of Residue theorem to the properly chosen integrals around a unit circle and semicircle.

Text Book:

[1] Grewal, B.S., *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 43rd ed., 2014.

Reference Books:

[1] Kreyszig E., *"Advanced Engineering Mathematics"*, *John Wiley & Sons, Inc.,* U.K 9/e,2013.

[2] Churchill R.V., *"Complex Variable and its Applications"*, McGraw Hill, N Y, 9th ed., 2013.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: find the Laplace transform of a given function and apply Laplace transform to solve certain differential equations whose solutions cannot be computed using classical methods

CO2: describe a given function as Fourier series in an interval and understand its importance in engineering

CO3: understand the concept of function of complex variable and verify whether a function is analytic or not, construct analytic function when real / imaginary part of function is known; find the velocity potential and the stream function of a fluid flow using complex analytical methods

CO4: represent a given function in Taylor's and Laurent's series and evaluate certain real integrals using integral theorems

Course Articulation Matrix (CAM):U18MH301 ENGINEERING MATHEMATICS-III																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18MH301.1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	U18MH301.2	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	U18MH301.3	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	U18MH301.4	2	1	-	-	-	-	-	-	-	-	-	1	1	-	1
U18MH301		2	1.75	-	-	-	-	-	-	-	-	-	1	1	-	1

U18MH302 PROFESSIONAL ENGLISH

Class: B.Tech. III- Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):
This course will develop the student's knowledge in/on
LO1: reading skill and sub skills to comprehend the text
LO2: vocabulary and using it appropriately to describe situations
LO3: using phrasal verbs in speech and writing
LO4: grammar and improve language ability to write effectively

Week	Topic Name
I	**I.** Reading Comprehension- Significance of Reading Skimming **II.** Verbal Ability-Synonyms **III.** Grammar-Articles
II	**I.** Reading Comprehension-Scanning **II.** Verbal Ability-Antonyms **III.** Grammar-Articles
III	**I.** Reading Comprehension- Critical Reading **II.** Verbal Ability- Sentence completion with correct alternative word/group **III.** Grammar-Prepositions
IV	**I.** Reading Comprehension- Intensive Reading **II.** Verbal Ability- Sentence completion with correct alternative word/group **III.** Grammar- Reported Speech
V	**I.** Reading Comprehension- Intensive Reading **II.** Verbal Ability- Jumbled Sentences **III.** Grammar- Error Detection
VI	**I.** Reading Comprehension- Inferential Reading **II.** Verbal Ability- Jumbled Sentences **III.** Grammar- Error Detection
VII	**I.** Reading Comprehension- Lexical Reading **II.** Verbal Ability- Phrasal Verbs **III.** Grammar- Tenses, Structures
VIII	**I.** Reading Comprehension- Read to Interpret **II.** Verbal Ability- Single Word Substitutes **III.** Grammar- Tenses, Uses
IX	**I.** Reading Comprehension- Read to Analyze **II.** Verbal Ability-Collocations **III.** Grammar- Tenses, Uses
X	**I.** Reading Comprehension- Read to Summarize **II.** Verbal Ability-Spellings **III.** Grammar, Agreement between Subject & verb(concord)

Text Books:

[1] *Professional English Manual* prepared by the faculty of English, KITSW

[2] Arun Sharma & Meenakshi Upadhyay, *Verbal Ability and Reading Comprehension for CAT & Other Management Examinations,* 8th Edition, McGraw Hill Education (India) Private Ltd, Chennai,2018

Reference Books:

[1] Nishit K. Sinha, *Verbal Ability and Reading Comprehension for the CAT,* 3rd Edition Pearson India Education Services Pvt. Ltd., Chennai

[2] Harper Collins, *Collins COBUILD English Grammar*, 3rd Edition, Harper Collins Publishers Ltd

[3] Rosemary & Courtney, *Longman-English-Chinese Dictionary of Phrasal Verbs,* Longman Publishers

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: analyze the passage using skill and sub skill to solve different types of questions related to reading comprehension

CO2: identify grammatical errors in the given sentences and correct them

CO3: select correct synonyms/antonyms/phrasal verbs and complete sentences with suitable words or phrases

CO4: keep the given jumbled sentences in proper sequence to make a coherent paragraph

Course Articulation Matrix (CAM):U18MH302 PROFESSIONAL ENGLISH

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18MH302.1	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
CO2	U18MH302.2	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
CO3	U18MH302.3	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
CO4	U18MH302.4	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
U18MH302		-	-	-	-	-	-	-	-	1	2	-	1	1	1	1

U18CN303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Class: B.Tech. III- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in / on…
LO1: the basic concepts of programming paradigms and java programming
LO2: concepts of classes, methods and strings
LO3: types of inheritance and interfaces
LO4: concepts of packages, streams (I/O), exceptional handling and multithreading

UNIT-I (9+3)

Programming Paradigms: Procedural programming, Modular programming, Object oriented programming (OOP), Generic programming

Java Basics: History and evolution of Java, An overview of java, Data types, Variables and arrays, Operators, Control statements

Introducing Classes: Structures in C, Class fundamentals, Objects, Methods, Object reference variables

UNIT-II (9+3)

Classes and Methods: Overloading methods, *this* keyword, Passing and returning objects, Recursion, Variable length arguments, Constructors, Overloading constructors, Garbage collection, Static variables, Static blocks, Static methods, Nested and inner classes, Command line arguments, Wrapper classes

Strings: Exploring String, StringBuffer, StringBuilder and StringTokenizer classes

UNIT-III (9+3)

Inheritance: Inheritance basics, Types of inheritance, *super* keyword, Method overriding, Order of constructors calling, Dynamic method dispatch, Abstract classes, *final* with inheritance, Object class

Interfaces: Defining an interface, implementing interfaces, Nested interfaces, Interfaces can be extended

UNIT-IV (9+3)

Packages: Packages, Packages and Member Access, Importing packages

Using I/O: I/O basics, Reading, Writing and copying files using byte and character streams

Exception Handling: Fundamentals, Exception types, Uncaught exceptions, Using *try* and *catch*, Multiple catch clauses, Nested try statements, *throw*, *throws*, *finally*

Multithreading: Creating a thread, Creating multiple threads, Thread priorities, Synchronization, Inter thread communication

Text Book:

[1] Herbert Schildt, *Java The Complete Reference*, 9th ed., New Delhi: McGraw-Hill Education,2019.

Reference Books:

[1] Kathy Sierra, Bert Bates, *Head First Java*, 2nd ed., Boston: O'Reilly Publications, 2005.
[2] Uttam K. Roy, *Advanced JAVA Programming*, England: Oxford Publications, 2013.
[3] Balaguru swamy, *Programming with Java: A Primer*, 6th ed., New Delhi: McGraw-Hill Education India Pvt. Ltd, 2019.
[4] Tanweer Alam, *Internet and Java Programming*, New Delhi: Khanna Publishing House, 2010.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: apply the basic OOP concepts using java
CO2: develop programs using classes, constructors and strings
CO3: develop programs using inheritance, dynamic method dispatch, interfaces
CO4: construct packages, develop programs using streams (I/O), exception handling and multithreading

Course Articulation Matrix (CAM):U18CN303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN303.1	1	1	1	1	-	-	-	-	-	1	-	-	1	1	2
CO2	U18CN303.2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
CO3	U18CN303.3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
CO4	U18CN303.4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN303		1.75	1.75	1.75	1	-	-	-	-	-	1	-	2	1.75	1	2.75

U18CN304R22 OPERATING SYSTEMS

Class: B.Tech. III-Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: basics of operating system, system structure
LO2: process concept, scheduling and process synchronization techniques
LO3: handling deadlocks, memory management and virtual memory techniques
LO4: file system organization, disk management and protection techniques

UNIT – I (9)

Introduction: What operating systems do, Computer system architecture, Operating system operations, Process management, Memory management, Storage management, Protection and security, Computing environments

Operating System Structures: Operating system services, System calls, Types of system calls, System programs, Operating system structure, System boot

UNIT - II (9)

Process Concept: Process concept, Process scheduling, Inter process communication

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms– First come first serve, Shortest job first, Priority, Round robin, Multilevel queue, Multilevel feedback queue

Process Synchronization: Background, The critical section problem, Petersons' solution, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Monitors

UNIT – III (9)

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

Memory Management: Background, Swapping, Contiguous memory allocation, Segmentation, Paging, Structure of page table – Hierarchical paging, Hashed page tables, Inverted page tables

Virtual Memory Management: Background, Demand paging, Page replacement, Allocation of frames, Thrashing

UNIT - IV (9)

File-System Interface: File concept, Access methods, Directory Structure, Implementing File Systems – Allocation Methods, Free space management

Mass-Storage Structure: Overview of mass storage structure, Disk structure, Disk scheduling, Disk Management, Swap space management

System Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix

Text Book:

[1] Abraham Silberschatz, Peter B Galvin, Gerg Gagne, *Operating System Concepts*, 9th ed., United States of America: Wiley, 2016.

Reference Books:

[1] EktaWalia, *Operating Systems*, 2nd ed., New Delhi: Khanna Publishing House, 2019.
[2] William Stalling, *Operating Systems*, 9th ed., United States of America: Person, 2018.
[3] Dhananjay M. Dhamdhere, *Operating Systems A Concept-Based Approach*, 3rd ed., New Delhi: McGraw Hill, 2017.
[4] Andrew S. Tanenbaum, Herbert BOS, *Modern Operating Systems*, 4th ed., United States of America: Person, 2016.

Course Research Papers: Research papers (Indexed journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: identify the components of operating system and the role of operating system in management policies
CO2: analyze the CPU scheduling algorithms and process synchronization problems
CO3: solve the deadlock related problems and memory management issues
CO4: evaluate the storage management policies, file management and protection methods

Course Articulation Matrix (CAM): U18CN304R22 OPERATING SYSTEMS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN304R22.1	1	1	2	1	-	-	-	-	-	1	-	1	2	1	2
CO2	U18CN304R22.2	2	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO3	U18CN304R22.3	2	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO4	U18CN304R22.4	2	2	2	1	-	1	-	-	-	1	-	1	2	1	2
U18CN304R22		1.75	1.75	2	1.5	-	1	-	-	-	1	-	1	2	1	2

U18CN305 COMPUTER ARCHITECTURE AND ORGANIZATION

Class: B. Tech. III–Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Examination	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…
LO1: functional units of a computer, principle components and instruction set architecture
LO2: processing unit and computation of arithmetic operations
LO3: memory unit and data transfer between processor, memory & I/O
LO4: architecture and operation of high performance computing

UNIT-I (9)

Basic Structure of Computers: Functional units, Basic operational concepts, Performance
Instruction Set Architecture: Memory locations and addresses, Memory operations, Instructions and instruction sequencing, Instruction formats, Addressing modes, Assembly language-Assembler directives

UNIT-II (9)

Basic Processing Unit: Fundamental concepts, Instruction execution, Hardware components, Instruction fetch and execution steps, Control signals, Hard-wired control, CISC-style processors
Arithmetic: Addition and subtraction of signed numbers, Multiplication of unsigned numbers, Multiplication of signed numbers, Fast multiplication, Integer division, Floating-point numbers and operations

UNIT-III (9)

The Memory System: Basic concepts, Semiconductor RAM memories-Internal organization of memory chips, Static memories, Dynamic RAMs; Read-only memories, Memory hierarchy, Cache memories, Performance considerations, Secondary storage
Input-Output Organization: Input-output interface- I/O bus and interface modules, I/O vs. memory bus, Isolated vs. memory-mapped I/O; Asynchronous data transfer- Strobe control, Handshaking, Asynchronous serial transfer

UNIT-IV (9)

Modes of Transfer: Modes of transfer, Priority interrupt, Direct Memory Access, Interconnection standards
Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, Vector processing
Multi Processors: Characteristics of multiprocessors, Interconnection structures

Text Books:

[1] Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, *Computer Organization and Embedded Systems*, 6th ed., New Delhi: McGraw-Hill Education, 2012. *(Chapters 1, 2, 5, 7-9)*

[2] M. Morris Mano, *Computer System Architecture*, Revised 3rd ed., New Delhi: Pearson Education, 2019. *(Chapters 9, 10, 11, 12, 14)*

Reference Books:

[1] B Ram, Sanjay Kumar, *Computer Fundamentals: Architecture and Organization*, 5th ed., New Delhi: New Age International Publishers, 2018.

[2] W. Stallings, *Computer Organization and Architecture - Designing for Performance*, 7th ed., New Delhi: Pearson Education, 2009.

[3] John P. Hayes, *Computer Architecture and Organization,* 3rd ed., New Delhi: McGraw-Hill Education, 1998.

[4] Vincent P. Heuring, Harry F. Jordan, *Computer Systems Design and Architecture*, 2nd ed., United States: Pearson Education, 2004.

Course Research Papers: Research papers (Journals/conference papers) relevant to the Course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: apply instruction formats for assembly language instructions and explain addressing modes

CO2: *classify hardwired & CISC style processors and solve arithmetic operations with signed and unsigned integers*

CO3: *design memory organization and explain data transfer between processor, memory & I/O*

CO4: *analyze different modes of data transfer and explain the concepts of parallel processing, pipelining for high performance computing systems*

Course Articulation Matrix (CAM): U18CN305 COMPUTER ARCHITECTURE AND ORGANIZATION

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN305.1	2	2	2	1	-	1	-	-	-	1	-	1	1	2	2
CO2	U18CN305.2	2	2	2	2	-	1	-	-	-	1	-	1	1	2	2
CO3	U18CN305.3	2	2	2	2	-	1	-	-	-	1	-	1	2	2	2
CO4	U18CN305.4	2	2	2	3	-	1	-	-	-	1	-	3	2	2	2
U18CN305		2	2	2	2	-	1	-	-	-	1	-	1.5	1.5	2	2

U18CN306 ADVANCED DATA STRUCTURES

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on

LO1: organizing and retrieving the data using binary tree, binary search trees
LO2: organizing and retrieving the data using AVL trees, B-Trees, Red black trees and Splay trees
LO3: organizing and retrieving the data using Interval tree, Hash tree, Tries, sorting and searching
LO4: organizing and retrieving the data using graphs and spanning trees

UNIT – I (9)

Trees: Introduction, types of trees.

Binary Tree: Creating a binary tree, traversing a binary tree: preorder, inorder, postorder and spiral order recursive traversals.

Binary Search Tree: Operations- Insertion, deletion, search, recursive and non-recursive traversal. Threaded binary trees.

UNIT – II (9)

AVL Trees: AVL trees operations–Insertion, Deletion and Traversal.

Multiway Search Trees: Introduction to m-way search trees. Operations on B-Trees-Insertion, deletion, search. B+ trees.

Red-Black Trees: Properties, operations, applications. splay trees.

UNIT - III (9)

Interval Tree, Hash tree.

Tries: Trie structure. Operations on Tries, Applications of Tree indexing.

Searching and Internal Sorting: Fibonacci search, quick sort, merge sort, heap sort, bitonic generator sort; time complexities of above searching and sorting techniques.

UNIT – IV (9)

Graphs: Introduction, graph terminology, representation of graphs.

Application of Graph Structures: Topological sorting. Minimum Spanning Trees**:** Prim's algorithm, Kruskal's algorithm. Graphs traversal methods- breadth first search, depth first search. Kosaraju's algorithm.

String manipulations, String compression -Run Length Encoding.

String Matching Algorithms- Naive Algorithm, (Knuth Morris Pratt) Algorithm, Boyer Moore Algorithm, Rabin Karp Algorithm.

Text Book:

[1] Debasis Samantha, *Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009. *(Chapters 3 to 8, 10, 11)*

Reference Books:

[1] Reema Thareja, *Data Structures Using C,* 2nd ed., New Delhi: Oxford University Press,2014.

[2] Richard F. Gilberg and Behrouz A.Forouzan, *Data Structures: A Pseudo code Approach with C*, 2nd ed., New Delhi: Cengage Learning 2007.

[3] Adam Drozdek, *Data Structures and Algorithms in C++,* 3rd ed., New Delhi, Thomson, 2006.

[4] Samir Kumar Bandyopadhyay Kashinath Dey, *Data Structures Using C*, Pearson India, 2008.

Course Research Paper (CRP): Research papers (Indexed journal/conference papers) relevant to the course content by the course faculty in Course Web page. Students have to write a two page summary on CRP and submit as part of special assignment.

Course Patent (CP): Patents relevant to the course content will be posted by the course faculty in Course Web page. Students have to write a twopage summary on CP and submit as part of special assignment.

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to

CO1: develop programs using binary trees, binary search trees to optimize database queries.

CO2: utilize balanced search trees such as B-trees, B+-trees, red black and Splay trees in solving the problems on Database management.

CO3: organize and retrieve the data using Interval tree, Hash tree, Tries, sorting and searching in solving the problems like auto-complete.

CO4: organize and retrieve the data using Graphs and different types of spanning trees used for GPS navigation.

Course Articulation Matrix (CAM):U18CN306R22 ADVANCED DATA STRUCTURES																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN306R22.1	2	2	2	2	1	1	-	1	1	1	-	1	2	2	2
CO2	U18CN306R22.2	2	2	2	2	1	1	-	1	1	1	-	1	2	2	2
CO3	U18CN306R22.3	2	2	2	2	1	1	-	1	1	1	-	2	2	2	2
CO4	U18CN306R22.4	2	2	2	2	1	1	-	1	1	1	-	2	2	2	2
U18CN306R22		2	2	2	2	1	1	-	1	1	1	-	1.5	2	2	2

U18EI309 DIGITAL ELECTRONICS

Class: B.Tech. III-Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: switching algebra and various minimization techniques of switching functions
LO2: various combinational circuits and their applications
LO3: types of flip flops and their use in the design of sequential circuits
LO4: finite state machines, their minimization; different logic family circuits and their operation

UNIT – I (9)

Number Systems and Codes: Representation of number systems, conversion of numbers from one radix to other, Binary arithmetic, Signed binary numbers, r's and (r-1)'s complements, 1's and 2's complement subtraction, Binary weighted and non-weighted codes – BCD, Self complementing, Excess-3, Gray codes

Boolean Algebra and Minimization: Postulates and theorems; logic gates –symbols and truth tables, realization of switching functions - AOI, NAND-NAND and NOR-NOR realizations; minimization of switching functions - using theorems, standard SOP & POS forms, Karnaugh map and Quine - McClusky techniques

UNIT – II (9)

Combinational circuits: Design of combinational circuits using logic gates –Half adder, Full adder, Half subtractor, Full subtractor, Parallel adder, Serial adder, Carry look ahead adder, BCD adder and 1's & 2's complement adder/subtractors; Decoders - BCD to 7 segment, BCD to Decimal; Encoders, Priority encoders; Multiplexers, Demultiplexers, Realization of switching functions using Multiplexers and Decoders

UNIT – III (9)

Sequential circuits: NAND RS latch, NOR RS latch; Flip flops- SR, JK, D and T, preset and clear inputs, truth tables, excitation tables , race around condition, Master slave flip flop, conversion of one flip flop to other; Binary counters – design of asynchronous (ripple) and synchronous counters; Shift registers – modes of operation, bidirectional & universal types, Ring and Johnson counters

Synchronous sequential circuits: State table, state diagram, state assignment, design of synchronous binary counters

UNIT – IV (9)

Finite State Machines: Capabilities and limitations of Finite State Machines , state equivalence, state minimization of completely specified machines using Partition technique, state minimization of incompletely specified machines using Merger graphs and Merger tables

Text Book:

[1] Zvi. Kohavi, *Switching and Finite Automata Theory*, Tata McGraw-Hill, 2nd ed., 2008, New Delhi. (Chapter 3,4,5 and 9)

[2] Moris Mano, *Digital Design,* PHI , 3rd edn., 2003, New Delhi. (Chapters 2 to 6 and 10)

Reference Books:

[1] R.P. Jain, *Modern Digital Electronics*, Tata McGraw-Hill, 3rd ed., 2003, New Delhi

[2] A.Anand Kumar, *Switching Theory and Logic Design,* PHI ,1st ed., 2013, New Delhi

[3] Herbert Taub and Donald Schilling, *Digital Integrated Circuits*, Tata McGraw-Hill 2008, New Delhi.

Course Research Papers: Research papers (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: apply various minimization techniques to obtain minimal SOP/POS forms of switching functions

CO2: design different combinational circuits to implement logic functions

CO3: explain the operation of flip flops and design sequential circuits like counters, shift registers, sequence detectors etc

CO4: minimize completely and incompletely specified state machines; explain the operation of various logic family circuits and their performance characteristics m

Course Articulation Matrix (CAM): U18EI309 DIGITAL ELECTRONICS

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18EI309.1	3	2	-	2	2	-	-	-	-	-	-	1	1	-	1
CO2	U18EI309.2	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1
CO3	U18EI309.3	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1
CO4	U18EI309.4	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1
U18EI309		3	2	1	2	2	-	-	-	-	-	-	1	1	-	1

U18CN310 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

Class: B.Tech. III- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in / on…

LO1: the basic concepts of java programming and change from procedural programming approach to object oriented programming approach
LO2: building fundamental java programs related to classes, methods and strings
LO3: designing java programs effectively with the help of inheritance and interface concepts
LO4: importance of packages, I/O, exceptional handling and multithread programming using java.

List of Experiments

Experiment-I

1. Write a program to demonstrate different operators in java
2. Write a program to demonstrate control structures
3. Write a program to demonstrate switch statement

Experiment-II

1. Write a program to read an array and display them using *for-each* control. Finally display the sum of array elements
2. Write a program to read a matrix and display whether it is an identity matrix or not. Use *civilized form of break* statement
3. Write a program to define a two-dimensional (2D) array where each row contains different number of columns. Display the 2D-array using *for-each*

Experiment-III

1. Write a program to demonstrate class concept
2. Write a program to demonstrate *this* keyword
3. Write a program to demonstrate object reference variable
4. Write a program to demonstrate overloading of methods
5. Write a program to demonstrate passing and returning objects

Experiment-IV

1. Write a program to demonstrate variable length argument (using array and ellipsis notation)
2. Write a program to demonstrate constructors and garbage collection
3. Write a program to demonstrate nested and inner classes
4. Write a program to demonstrate static variables, *static* methods, and *static* blocks

Experiment-V

1. Read at least five strings from command line argument and display them in sorted order
2. Write a program to demonstrate wrapper class by reading N number of integers from command line and display their sum

3. Write a program to demonstrate wrapper class by reading N floating point numbers from command line and display their average

Experiment-VI

1. Write a program to accept a string, count number of vowels and remove all vowels
2. Write a program to accept a string, count number of vowels and remove all vowels using *StringBuffer* class
3. Write a program to accept a line of text, tokenize the line using *StringTokenizer* class and print the tokens in reverse order

Experiment-VII

1. Write a program to demonstrate single level-inheritance
2. Write a program to demonstrate multilevel-inheritance using super
3. Write a program to demonstrate method overriding

Experiment-VIII

1. Write program to demonstrate dynamic method dispatch
2. Write a program to demonstrate use of abstract class
3. Write a program to demonstrate the use of overriding *equals()* method of an Object class

Experiment-IX

1. Write a program to implement interfaces
2. Write a program to extend the interfaces
3. Write a program to demonstrate implementation of nested interfaces

Experiment-X

1. Write a program to create a package, and demonstrate to import the package into any java program (Consider the behavior of all access specifiers)

Experiment-XI

1. Write a program to demonstrate *try-catch-finally* block
2. Write a program to demonstrate *throw* clause
3. Write a program to demonstrate *throws* clause
4. Write a program to demonstrate *re-throw* an exception, and *finally* block

Experiment-XII

1. Write a program to demonstrate read/write/copy a file using *byte stream*
2. Write a program to demonstrate read/write/copy a file using *character* stream
3. Write a program to create a thread (using *Thread* class or *Runnable* interface)
4. Write a program to demonstrate *synchronization* of threads
5. Write a program to demonstrate *Inter thread communication*

Laboratory Manual:

[1] *Object Oriented Programming through Java Laboratory Manual*, Dept. of CSE (Networks), KITSW.

Reference Book:

[1] Herbert Schildt, *Java The Complete Reference*, 11th ed., New Delhi: McGraw-Hill Education,2019.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles

in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: write fundamental programs using java constructs
CO2: develop programs using OOP concepts like classes, constructors and strings
CO3: develop programs using inheritance, dynamic method dispatch and interfaces
CO4: *construct packages, develop programs using streams (I/O), exception handling and multithreading*

Course Articulation Matrix (CAM): U18CN310 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN310.1	2	2	2	1	-	-	-	-	-	1	-	-	2	1	2
CO2	U18CN310.2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
CO3	U18CN310.3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
CO4	U18CN310.4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN310		2	2	2	1	-	-	-	-	-	1	-	2	2	1	2.75

U18CN311R22 ADVANCED DATA STRUCTURES LABORATORY

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering(Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on

LO1: organizing and retrieving the data using binary tree, binary search trees
LO2: organizing and retrieving the data using AVL trees, B-Trees, Red black trees and Splay trees.
LO3: organizing and retrieving the data using Interval tree, Hash tree, Tries, sorting and searching.
LO4: organizing and retrieving the data using graphs and spanning trees

List of Experiments

Experiment-I

1. Program to perform following binary tree operations.
   i) creation ii) traversal using recursion.

Experiment-II

1. Program to perform following binary search tree operations.
   i) insertion ii) deletion of a node iii) traversal using recursion.

Experiment III

1. Program to perform following binary search tree traversal operations without recursion.
   i) Inorder ii) Preorder iii) Postorder iv) Spiral order

Experiment-IV

1. Program to implement AVL tree construction.

Experiment-V

1. Program to implement B-tree construction.

Experiment-VI

1. Program to implement search and insert operations on Trie.
2. Program to implement Fibonacci search

Experiment-VII

1. Program to implement Quick sort.
2. Program to implement Merge sort.

Experiment-VIII

1. Program to implement heap sort.
2. Program to implement Bitonic generator sort.

Experiment-IX

1. Program to implement Topological sort.
2. Program to implement the following graph traversal techniques.
3. a) Prim's algorithm b) Kruskal's algorithm

Experiment-X

1. Program to implement the following graph traversal techniques.
   a) Depth first search b) Breadth first search.
2. Program to implement Kosaraju's algorithm.

Experiment-XI

1. Program to implement Naive Algorithm.
2. Program to implement Knuth - Morris – Pratt (KMP) Algorithm.

Experiment-XII

1. Program to implement Boyer Moore Algorithm.
2. Program to implement Rabin Karp Algorithm.

Laboratory Manual:

[1] '*Advanced Data Structures*' laboratory manual, prepared by faculty of Dept. of Computer Science &Engineering (Networks).

Reference Books:

[1] DebasisSamanta, *Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009.

[2] Reema Thareja, *Data Structures Using C,* 2nded., New Delhi: Oxford University Press, 2014.

[3] Richard F. Gilberg and Behrouz A. Forouzan, *Data Structures: A Pseudo code Approach with C*, 2nd ed., New Delhi: Cengage Learning 2007.

[4] Adam Drozdek, *Data Structures and Algorithms in C++*,3rd ed., New Delhi, Thomson, 2006.

[5] Samir Kumar Bandyopadhyay, Kashinath Dey, *Data Structures Using C,* Pearson India, 2008.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes(COs):

On completion of this course, students will be able to

CO1: develop programs using binary trees, binary search trees
CO2: utilize balanced search trees such as B-trees, B+trees, red black and Splay trees in solving the problems
CO3: organize and retrieve the data using Interval tree, Hash tree, Tries, sorting and searching
CO4: organize and retrieve the data using Graphs and different types of spanning trees

U18CN311R22 ADVANCED DATA STRUCTURES LABORATORY																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN311R22.1	1	1	3	1	1	1	1	1	-	1	-	2	1	1	3
CO2	U18CN311R22.2	1	1	2	2	1	1	1	1	-	1	-	2	1	1	2
CO3	U18CN311R22.3	1	1	3	3	2	1	1	1	-	1	-	3	1	1	3
CO4	U18CN311R22.4	1	1	3	2	3	2	2	2	-	2	-	3	1	1	3
U18CN311R22		1	1	2.75	2	1.75	1.25	1.25	1.25	-	1.25	-	2.5	1	1	2.75

U18MH315 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: basic structure of Indian knowledge system
LO2: Indian perspective of modern science
LO3: basic principles of yoga and holistic health care
LO4: benefits of yoga practice

UNIT – I (6)

Basic Structure of Indian Knowledge System: Introduction, Vedas – Origin, Classification, Structure, Rig Veda, Sama Veda, Yajur Veda, Atharva Veda; Upa vedas – Dhanur veda, Sthapat veda, Gandharva veda, Ayur veda; Vedang – Shiksha, Chanda, Vyakarna, Nirukta, Kalpa, Jyothisha; Upanga – Dharma shastra, Mimamsa, Tarka shastra,Purana

UNIT – II (6)

Modern Science and Indian Knowledge System: Introduction – Vedas as Basis for Modern Science – Architectural Developments – Medicine and its relevance – Mathematical Sciences in Vedas – Space and Military related developments – Chemical Sciences

UNIT – III (6)

Yoga and Holistic Health Care: Healthy mind in healthy body – Yoga: Definition, types; Yoga to keep fit: Diet, Yoga Asanas – Fundamentals; Breathing techniques in Patanjali Yoga tradition – Pranayama, chakras, meditation, Benefits of Yoga – Physical Health, Emotional Health, Prevention of Disease, Reducing or Alleviating Symptoms of Problems

UNIT – IV (6)

Case studies – Yoga Practice: Yoga as an effective tool for management of human crisis – Depression, Self – Concept & Mental health, Yoga for stress management, Yoga: A way to cure for Insomnia

Requisite: Yoga practice sessions are to be conducted for all the students taking this course by the time they complete Unit 1 and Unit 2

Text Book:

[1] Sathish Chandra Chaterjee, Dhirendramohan Datta, *An Introduction to Indian Philosophy*, Rupa Publications Pvt. Ltd. New Delhi. (Chapter 2,3)

[2] Priyadaranjan Ray, S.N. Sen, *The Cultural Heritage of India*, Vol. 6, Science and Technology, The Ramakrishna Mission Institute of Culture, Calcutta

[3] *Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata

[4] RN Jha, *Science of Consciousness Psychotherapy and Yoga Practices*, Vidyanidhi Prakasha, Delhi, 2016 (Chapter 4, 5, 6, 7,8)

Reference Books:

[1] Swami Jitatmananda, *Holistic Science and Vedanta*, Bharatiya Vidya Bhavan Bombay (Chapter 2, 3)

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: summarize the basic structure of Vedas, Upa vedas, Vedanga, Upanga

CO2: explain Vedas as principal source of knowledge for scientific inventions

CO3: describe different yoga asanas, breathing techniques, chakras, meditation and their benefits

CO4: discuss the benefits of yoga as an effective tool for management of human crisis

Course Articulation Matrix (CAM): U18MH315 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18MH315.1	-	-	-		-	1	-	2	1	1	-	-	-	-	-
CO2	U18MH315.2	-		-		-	1	1	2	1	1	-	-	-	-	-
CO3	U18MH315.3	-		-		-	1	-	2	2	1	-	2	-	-	-
CO4	U18MH315.4	-		-		-	1	1	2	2	1	-	2	-	-	-
U18MH315		-	-	-		-	1	1	2	1.5	1	-	2	-	-	-

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
IV-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[6Th+3P+1MC]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60	100
2	HSMC	U18TP402	Soft and Inter Personal Skills	-	-	2	1	100	-	100	-	100
3	OE	U18OE403	Open Elective-I	3	-	-	3	10	30	40	60	100
4	PCC	U18CN404	Theory of Computation	3	-	-	3	10	30	40	60	100
5	PCC	U18CN405R22	Database Management Systems	3	-	-	3	10	30	40	60	100
6	PCC	U18CN406R22	Computer Networks	3	-	-	3	10	30	40	60	100
7	PCC	U18CN407R22	Database Management Systems Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN408R22	Computer Networks Laboratory	-	-	2	1	40	-	40	60	100
9	OE	U18OE411	Open Elective-I based Laboratory	_	_	2	1	40	-	40	60	100
			Total:	17	1	8	20	280	180	460	540	1000
11	MC	U18CH416	Environmental Studies*	2	_	_	_	10	30	40	60	100

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 26** **Total Credits: 20**

Open Elective-I:	Open Elective-II:	Open Elective-I based Lab:
U18OE403A: Object Oriented Programming (CSE) U18OE403B: Fluid Mechanics & Hydraulic Machines(CE) U18OE403C: Mechatronics (ME) U18OE403D: Web Programming (IT) U18OE403E: Microprocessors (ECE) U18OE403F: Strength of Materials (ME)	U18OE401A: Applicable Mathematics (MH) U18OE401B: Basic Electronics Engineering (ECE) U18OE401C: Elements of Mechanical Engineering (ME) U18OE401D: Measurements & Instrumentation (EIE) U18OE401E: Fundamentals of Computer Networks (CSE) U18OE401F: Renewable Energy Sources (EEE)	U18OE411A: Object Oriented Programming Laboratory (CSE) U18OE411B: Fluid Mechanics & Hydraulic Machines Laboratory (CE) U18OE411C: Mechatronics Laboratory (ME) U18OE411D: Web Programming Laboratory (IT) U18OE411E: Microprocessors Laboratory (ECE) U18OE411F: Strength of Materials Laboratory (CE)

Stream-I: ME, CSE, IT, CSN, CSE(IOT) **Stream-II: CE, EIE, EEE, ECE, ECI,CSE(AI&ML)**

U18OE401A APPLICABLE MATHEMATICS

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: application of Fourier series to solve wave equation, heat conduction equation and Laplace equation

LO2: the methods of fitting curves by the method of least squares, statistical methods and probability distributions with applications to engineering disciplines.

LO3: finite difference operators; the concept of interpolation and numerical integration.

LO4: numerical methods and application to find numerical solutions of differential equations.

UNIT-I (9+3)

Applications of Partial Differential Equations: Basic concepts of partial differential equations, classification of second order partial differential equations, solution of a partial differential equation, solution through the method of separation of variables.

Vibrating String: Wave equation and its solution by the method of separation of variables, D'Alembert's solution of wave equation, solutions of various boundary value problems based on vibrating string.

One Dimensional Heat Flow: Transient heat flow equation, heat flow through a bar of finite length with homogeneous and non homogeneous boundary conditions, heat flow through a bar with insulated ends.

Two Dimensional Heat Flow: Equation of two dimensional heat flow (Laplace's equation) under steady state / the electrostatic potential of electrical charges in any region that is free of these charges (problems based on Trigonometric FS only),solution of Laplace's equation in Cartesian and polar form, heat flow through infinite rectangular plates, finite square plate and semi circular and circular plates.

UNIT-II (9+3)

Statistics: Statistical data: Review of measures of central tendency and measures of dispersion, correlation coefficient, rank correlation, regression – Linear regression equations.

Curve Fitting: Method of least squares –fitting of (i) Straight line (ii) Second degree parabola (iii) Exponential curves, most plausible solution of a system of linear algebraic equations.

Probability: Review of the concepts of probability, random variables, Discrete and continuous probability distributions, mean and variance of a distribution, Binomial distribution, Poisson distribution, and Normal distribution, fitting of these probability distributions to the given data.

UNIT-III (9+3)

Numerical Analysis: Finite differences and difference operators.

Interpolation: Newton's forward and backward interpolation formulae. Lagrange interpolation

Numerical Differentiation: First and second derivatives using forward and backward interpolation polynomials at the tabulated points.

Numerical Integration: Gaussian quadrature formula, Trapezoidal rule, Simpson's $1/3^{rd}$rule and Simpson's 3/ 8^{th} rule.

UNIT-IV (9+3)

Solution to System of Linear Equations: Gaussian elimination method, Jacobi Method and Guass-Siedel Iteration Method.

Numerical Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method and Newton Raphson's method.

Numerical Solution of Ordinary Differential Equations: Taylor's method, Picard's method, Euler's method and Runge - Kutta methods of second and fourth order**.**

Text Book:

[1] Grewal, B.S., *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 43/e, 2014.

Reference Books:

[1] Gupta and Kapoor, *Fundamentals of Mathematical Statistics*, Sulthan Chand and & sons, New Delhi, 11^{th} ed., 2010.

[2] Kreyszig E., *Advanced Engineering Mathematics*, John Wiley & sons,Inc., U.K., 9^{th} ed.,2013

[3] Sastry S.S, *Introduction to numerical Analysis*, Prentice Hall of India Private Limited, New Delhi, 4^{th} ed., 2005.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: solve wave equation, heat conduction equation and Laplace equation using Fourier series

CO2: find correlation regression coefficients, fit curves using method of least squares forgiven data and apply theoretical probability distributions in decision making

CO3: estimate value of a function by applying interpolation formulae

CO4: apply numerical methods to solve simultaneous algebraic equations, differential equations, find roots of algebraic and transcendental equations

Course Articulation Matrix (CAM): U18OE401A APPLICABLE MATHEMATICS

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE401A.1	2	2	-	-	-	-	-	-	-	-	-	1	2	2	2
CO2	U18OE401A.2	2	2	-	-	-	-	-	-	-	-	-	1	2	2	2
CO3	U18OE401A.3	2	2	-	-	-	-	-	-	-	-	-	1	2	2	2
CO4	U18OE401A.4	2	2	-	-	-	-	-	-	-	-	-	1	2	2	2
U18OE401A		2	2	-	-	-	-	-	-	-	-	-	1	2	2	2

U18OE401B BASIC ELECTRONICS ENGINEERING

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: to introduce the basic concepts of semiconductors and conductivity in semiconductors

LO2: to impart the knowledge on working of semiconductor diode as Rectifier

LO3: to make the students to understand the basic concepts of BJT &DC biasing concepts

LO4: to introduce the fundamental concepts and basic principles of special semiconductor devices

UNIT-I (9+3)

Introduction to Electronics: Analog Signals (DC & AC), Sources (DC & AC), Digital Signals

Semiconductors: Energy bands in solids, Concept of forbidden gap, Insulator, Metals and Semiconductors, Transport phenomenon in semiconductors: Mobility and conductivity, Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect

UNIT-II (9+3)

Semiconductor Diode: Junction, Band diagram, Depletion layer, V-I characteristics of P-N Diode, Diode resistance and capacitance, Avalanche and Zener breakdown mechanisms

Diode Circuits: Rectifier circuits – Half wave, Full wave & Bridge rectifiers, Ripple factor with and without filters, Voltage regulation using Zener diode, Block diagram of DC adapter

UNIT-III (9+3)

Bipolar Junction Transistor: Physical structure, Transistor current components, CE, CB & CC configurations and their Input & Output characteristics

DC Analysis of BJT Circuits: DC load line, Need for biasing, Transistor biasing techniques for CE configuration, Basic transistor applications: Switch and Amplifier

UNIT-IV (9+3)

Field Effect Transistor: Physical structure, Operation and Characteristics of a Junction Field Effect Transistor (J FET), MOS FET, DMOS FET, EMOS FET

Special Semiconductor Devices: Operation and Characteristics- Tunnel Diode, Schottky diode, Photo Diode, Photo Transistor, PIN Diode, LED, LASER, UJT

Text Book:

[1] Bhargava and Kulashresta, *Basic Electronics and Linear Circuits*, TTTI, TMH, India.
[2] S.Salivahanan and N.Suresh Kumar, *Electronic Devices and Circuits*, Tata McGraw Hill Education (India) Private Ltd, 2nd Edition, 2009.

Reference Books:

[1] Jacob Millman, Christos C Halkias, *Electronic Devices and Circuits*, 3/e, TMH, India.
[2] David.A.Bell, *Electronic Devices and Circuits*, Oxford University Press, New Delhi, India
[3] Neil storey, *Electronics: A systems Approach*, 4th ed., Pearson Education Publishing company Pvt. Ltd, India.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…
CO1: analyze the behavior of semiconductor devices
CO2 design half wave and full wave rectifier circuits with filters
CO3: characterize BJT configurations with input output characteristics and biasing techniques
CO4: acquire knowledge of new emerging areas of science and technology in differentiating semiconductor devices

Course Articulation Matrix (CAM): U18OE401B BASIC ELECTRONICS ENGINEERING

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE401B.1	2	2	1	2	-	-	-	-	-	-	-	-	2	-	1
CO2	U18OE401B.2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	U18OE401B.3	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-
CO4	U18OE401B.4	2	2	1	2	-	-	-	-	-	-	-	2	2	-	1
U18OE401B		2	2	1.5	2	-	-	-	-	-	-	-	2	2	-	1

U18OE401C ELEMENTS OF MECHANICAL ENGINEERING

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: types of materials, design methodology and elements of power transmission

LO2: different manufacturing processes and their applications

LO3: laws of thermodynamics and types of systems

LO4: principle and applications of SI & CI engines

UNIT-I (9+3)

Engineering Materials: Classification, properties and applications

Design Criterion: Discrete steps in engineering design process

Power Transmission: Classification, flat belt drives - length of open and cross belts, belt tensions and power transmitted, Gears-types and applications, spur gear- nomenclature

Bearings: Types – sliding& rolling contact bearings and applications

UNIT-II (9+3)

Manufacturing Processes: Classification; Foundry- steps in sand casting process; pattern-types, materials and allowances, mould cross section, moulding sand- composition and properties Machining: lathe machine- line diagram and operations; Welding-classification; principle of arc welding- AC and DC welding, principle of gas welding, principle of brazing and soldering

Metal forming process: forging, rolling, extrusion

UNIT-III (9+3)

Thermodynamics: System-types, state, property, process and cycle; Energy-property; Zeroth law, thermodynamic equilibrium, laws of perfect gases.

Law of Thermodynamics: First law- applied to a cycle, change of state, Internal energy, Enthalpy; Work and Heat in closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic; PMM-I, limitations of first law of thermodynamics

UNIT-IV (9+3)

Second Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence; Carnot cycle, Carnot theorem, heat engine, heat pump and refrigerator; working principle of domestic air conditioner-line diagram.

IC Engines: Classification; working principle of four and two stroke SI and CI engines

Text Book:

[1] Mathur, Mehta and Tiwari, *Elements of Mechanical Engineering*, Jain Brothers, New Delhi, 2017.

Reference Books:

[1] Hazra Chowdary. S. K and Bose, *Basic Mechanical Engineering*, Media Promoters and Publishers Pvt. Ltd, India, 2010.
[2] P. K. Nag, *Engineering Thermodynamics*, Tata McGraw Hill, New Delhi
[3] Hazra Chowdary. S. K and Bose, *Workshop Technology, Vol. I & II*, Media Promoters and publishers Pvt Ltd, India.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: explain mechanical properties of engineering materials and learn the steps in design methodology
CO2: describe the principles of manufacturing processes
CO3: apply first law of thermodynamics to various processes to calculate work and heat for a closed system
CO4: define second law of thermodynamics and demonstrate the working principle of IC engines

Course Articulation Matrix (CAM): U18OE401C ELEMENTS OF MECHANICAL ENGINEERING

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE401C.1	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
CO2	U18OE401C.2	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	U18OE401C.3	2	2	-	-	-	-	-	-	-	-	-	-	1	1	-
CO4	U18OE401C.4	2	2	-	-	-	-	-	-	-	-	-	-	1	1	-
U18OE401C		2	2	-	-	-	-	-	-	-	-	-	-	1	1	1

U18OE401D FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: working principle of DC measuring instruments; DC, AC bridge circuits and their applications

LO2: principle of operation of Q meter, DVM, DMM, CRO, DSO and display devices

LO3: working principle of various transducers and their applications

LO4: working principle of seismic transducers, piezoelectric accelerometer, sound level meter, level transducer flow meter and data acquisition system.

UNIT-I (9+3)

DC measuring instruments (principle of operation): Measurement system – block diagram and example; performance characteristics – accuracy, precision, resolution, threshold, span, % error and fidelity; DC meters (working principle) – PMMC mechanism, shunt type ammeter, series type voltmeter, shunt type ohmmeter; DC potentiometers - Crompton's DC potentiometer, calibration of meters (ammeter, voltmeter & wattmeter) using DC potentiometer

DC & AC bridges: General bridge balance equation, bridge calibration, applications of bridges, Wheatstone bridge, Maxwell bridge, Schering bridge, Wien's bridge

UNIT-II (9+3)

Electronic instruments (principle of operation): Q-meter – basic Q-meter circuit; digital meter – characteristics (resolution & count), DC & AC attenuators, block diagram of dual slope type digital voltmeter, block diagram of digital multi meter (DMM); oscilloscopes - working principle of cathode ray tube (CRT), block diagram of cathode ray oscilloscope (CRO), block diagram of digital storage oscilloscope (DSO); display devices - working principle of LED & LCD types

UNIT-III (9+3)

Transducers (principle of operation): Transducer - classification, examples and ideal requirements; sensors – cantilever beam & proving ring types of load cells, bourdon tube & diaphragm type pressure sensors; resistive transducers – piezo-resistive effect of strain gauge (SG), gauge factor, SG type force transducer, SG type pressure transducer and RTD; thermocouple type temperature transducer, LVDT type inductive transducer, differential type capacitive transducer, piezoelectric type transducer; photoelectric type transducer.

UNIT-IV (9+3)

Seismic transducers – displacement transducer, velocity pickup and accelerometer, piezoelectric accelerometer, sound level meter (block diagram), capacitive microphone, capacitive type level transducer (double electrode type), ultrasonic flow meter and electromagnetic flow meter; introduction to data acquisition (DAQ) system.

Text Book:

[1] P. Pruthviraj, B. Bhudaditya, S. Das and K. Chiranjib, *Electrical and Electronic Measurement and Instrumentation*, McGraw-Hill Education, 2nd edition, 2013, New Delhi. (Chapters 1 to 3, 8 to 10 and 13 to 15).

[2] Arun K. Ghosh, *Introduction to Transducers,* PHI, 4th edition, 2015,New Delhi. (Chapter 1- 7).

Reference Books:

[1] A.K. Sawhney, *Electrical and Electronics Measurements and Instrumentation*, Dhanpatrai & Co., 2015, New Delhi.

[2] Helfrick. A.D and Cooper W.D., *Modern Electronic Instrumentation and Measurement Techniques*, Pearson India Edition., 2nd edition, 2016, New Delhi

[3] B.C. Nakra, K.K Choudhry, *Instrumentation Measurement and Analysis*, TMH, 4th edition, 2008, New Delhi.

[4] D.V.S. Murthy, *Transducers and Instrumentation*, Prentice Hall of India, 2nd edition, 2012, New Delhi

Course Outcomes (COs):

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: explain about working principle of measurement system, PMMC based meters and applications of DC & AC bridge circuits

CO2: describe the principle of operation of Q-meter, DVM, DMM, CRO, DSO and display devices

CO3: elaborate on the working principle of resistive, inductive, capacitive and piezoelectric transducers and their applications

CO4: explain about seismic transducers, sound level meter, level transducer, flow meters and block diagram of data acquisition system

Course Articulation Matrix (CAM): U18OE401D FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE401D.1	2	1	1	1	-	-	1	-	-	-	-	1	1	1	1
CO2	U18OE401D.2	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
CO3	U18OE401D.3	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
CO4	U18OE401D.4	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18OE401D		2	1	1	1	-	-	1	-	-	-	-	1	1	1	1

U18OE401E FUNDAMENTALS OF COMPUTER NETWORKS

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: network topologies, network reference models, network architecture and data transmission

LO2: design issues and protocols of data link layer, error detection and correction, MAC protocols and ethernet standards

LO3: principles and design issues of network layer and internet protocols

LO4: transport layer design issues, protocols and application layer services

UNIT-I (9)

Introduction: History of Computer Networks and The Internet, Principles of Computer Network Design, Network Architecture, Network Types

Physical Layer: Factors Affecting Data Transmission, Data Transmission, Data Transmission Codes: Non-return to Zero, Manchester Encoding, Digital modulation & Modems, Transmission Media

UNIT-II (9)

Data Link Layer: Functions of Data Link Layer, Framing Techniques, Error Detection and Correction, Elementary Data Link Layer Protocols for Flow Control

Local Area Networks: Medium Access Protocols, LAN Protocol Stack, Ethernet Protocols, IEEE 802.11 LAN Standard: IEEE 802.11 Protocol Stack, Wireless LAN Topologies, Frames in IEEE 802.11

UNIT-III (9)

The Network Layer: Network Layer Services, Packet Switching Networks, The Internet Protocol(IP): IP Header in IPv4, IP Addressing in IPv4, Subnet addressing and Classless Inter-Domain Routing (CIDR), Address Resolution Protocol, Dynamic Host Configuration Protocol, Internet Layer Protocols, Fragmentation and Reassembly, IP Version 6: Motivation for IPv6 Development, Features of IPv6, IPv6 Address Representation

Routing Protocols: Elements of Routing Protocol Performance, Flooding, Distance- Vector and Link State Routing Protocols, Hierarchical Routing

UNIT-IV (9)

The Transport Layer: User Datagram Protocol, Transmission Control Protocol, TCP State Transition Diagram, Other TCP Timers, TCP Congestion Control

The Application Layer: World Wide Web, Domain Name System, Electronic Mail. Network Security: Threats and Vulnerabilities in Computer Networks, Cryptographic Algorithms, Data Encryption Standard

Text Book:

[1] Mayank Dave, *Computer Networks*,2nd Edition., Cengage Learning, ISBN:978-81-315- 0986-9 2014.

Reference Books:

[1] Forouzan, *Data Communication and Networking*, 5th Edition, *ISBN*978-0-07-296775- 3, *TMH*, 2012.

[2] William Stallings, *Data and Computer Communications*, Ninth Edition, Prentice-Hall India, ISBN-81-203-1240-6, 2011

[3] Andrew S.Tanenbaum , David J. Wetherall, *Computer Networks*, Fifth Edition, Pearson Education, ISBN-13: 978-0-13-212695-3, 2011

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: describe various network topologies, architecture and techniques for data transmission modes

CO2: outline various design issues in data link layer and develop protocols to handle data link layer operation

CO3: describe various design issues and develop protocols for network Layer

CO4: explain various design issues, protocols of transport layer & application layer services

Course Articulation Matrix (CAM): U18OE401E FUNDAMENTALS OF COMPUTER NETWORKS

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE401E.1	2	2	-	1	-	1	-	-	-	-	-	1	2	3	1
CO2	U18OE401E.2	3	3	2	1	1	1	-	-	-	-	-	1	3	3	1
CO3	U18OE401E.3	3	3	2	2	1	1	-	-	-	-	-	1	3	3	1
CO4	U18OE401E.4	3	3	2	2	1	1	-	-	-	-	-	1	3	3	1
U18OE401E		2.75	2.5	2	1.5	1	1	-	-	-	-	-	1	2.75	3	1

U18OE401F RENEWABLE ENERGY SOURCES

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: different renewable energy sources and principle of solar energy systems
LO2: wind energy, geothermal energy and MHD power generation systems
LO3: harnessing energy from oceans and biomass
LO4: working of fuel cells and different energy storage systems

UNIT-I (9)

Introduction: Conventional and non-conventional sources of energy – Brief Description of different Renewable energy sources

Solar Energy: Introduction to prospects of solar photovoltaic (SPV) systems, principle of a PV cell, large scale SPV systems, economic considerations of SPV systems, PV cell technology, merits and limits of SPV systems, applications of SPV systems-street lighting, domestic lighting, Battery charging, SPV pumping systems

UNIT-II (9)

Wind Energy: Principles of wind power- Operation of a wind turbine- Site Characteristics. **Geothermal Energy:** Origin and types of geothermal energy- Operational Difficulties- Vapor dominated systems- Liquid dominated systems- Petro- thermal systems

Magneto-Hydro Dynamic (Mhd) Power Generation: MHD system- Open and Closed systems- Advantages of MHD systems

UNIT-III (9)

Energy from Oceans: Ocean temperature differences, ocean waves-Wave motions and tides-Energy from the waves; Introduction of tidal power, basic principle of tidal power, components of tidal power plants, advantages and disadvantages.

Bio-Energy: Introduction-bio-mass conversion, technologies-wet process, dry process, photo synthesis; Biogas generation- biogas from power plant wastes, methods of maintaining biogas production, utilization of biogas, biogas gasification, applications of gasifiers

UNIT-IV (9)

Chemical Energy Sources: Introduction of fuel cells, Principle of Operation of fuel cell, Classification of Fuel cells, Advantages and disadvantages of fuel cells

Types of Energy Storage Systems: Introduction, Different types of Batteries, Ultra Capacitors, Flywheels, Super Conducting Magnetic storage

Text Book:

[1] Rai G.D, *Non-Conventional Energy Sources*, Khanna Publishers, New Delhi.

[2] Felix A. Farret, M. Godoy Simoes, *Integration of Alternative Sources of Energy*, John Wiley & Sons, 2006

[3] Bansal N.K, Kaleeman and M.Miller, *Renewable Energy Sources and Conversion Technology*, TATA Mc Graw-Hill, New Delhi

Reference Books:

[1] EL-Wakil M.M, *Power Plant Technology*, Mc Graw-Hill, New York.

[2] Duffie and Beckman, *Solar Energy Thermal Process*, John Wiley & Sons, New York

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: compare conventional and non-conventional energy resources; explain the working principle of solar energy harnessing and its applications

CO2: explain the working principles of wind energy, geothermal energy and MHD power generation systems

CO3: describe the harnessing of electric power from oceans and biomass

CO4: explain the principle of operation of fuel cells and different types of energy storage systems

Course Articulation Matrix (CAM): U18OE401F RENEWABLE ENERGY SOURCES

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE401F.1	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
CO2	U18OE401F.2	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
CO3	U18OE401F.3	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
CO4	U18OE401F.4	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
U18OE401F		3	-	-	-	-	-	1	-	-	-	-	-	3	-	-

U18TP402 SOFT AND INTER PERSONAL SKILLS

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Exam	-

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: logical construction of speech appropriate for the occasion and exhibiting team work
LO2: acquiring spontaneity, presence of mind for effective communication
LO3: identifying, analyzing the theme of the topic and understanding presentation skills
LO4: communicating professionally and developing strategies in selecting career objectives in line with industry expectations

LIST OF ACTIVITIES

Activity - I

1. Team interaction

Activity - II

1. SWOT analysis

Activity - III

1. Debate

Activity - IV

1. Group Discussion

Activity - V

1. Presentations through PPTs

Activity - VI

1. Video Synthesis

Activity - VII

1. Resume Writing

Activity - VIII

1. Email Etiquette

Activity - IX

1. My interview Plan: Self Introduction &FAQs {Comprehensive Presentation}

Activity - X

1. My Career Plan" Oral presentation {Comprehensive Presentation}

Text Books:

[1] Krishna Mohan & Meera Benerji, *Developing Communications Skills*

[2] Alex.K, *Soft Skills*

[3] Raman & Meenakshi, *Soft skills Cornerstone of Professional success*

References:

[1] https://onlinecourses.nptel.ac.in/noc19_hs20/preview

[2] https://onlinecourses.nptel.ac.in/noc18_hs30/preview

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Leaning Outcomes(COs):

On completion of this course, students will be able to

CO1: introspect to convert strengths into opportunities, identify weaknesses, bypass threats

CO2: present views on various issues confidently in a group

CO3: make effective PPT presentations, synthesize videos

CO4: prepare a professional resume, communicate effectively to attain better opportunities

Course Articulation Matrix (CAM): U18TP302/U18TP402 SOFT AND INTER PERSONAL SKILLS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18TP402.1	-	-	-	-	-	-	-	-	2	3	-	-	1	1	1
CO2	U18TP402.2	-	-	-	-	-	-	-	2	3	3	-	-	1	1	1
CO3	U18TP402.3	-	-	-	-	-	-	-	-	2	3	-	-	1	1	1
CO4	U18TP402.4	-	-	-	-	-	-	-	1	2	3	-	-	1	1	1
U18TP402		-	-	-	-	-	-	-	1.5	2.25	3	-	-	1	1	1

U18OE403A OBJECT ORIENTED PROGRAMMING

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: fundamentals of object oriented and java programming

LO2: classes, objects and inheritance for implementing object oriented concepts

LO3: polymorphism, interfaces and packages for realizing object oriented programming

LO4: manage Exceptional and I/O operations in application developments

UNIT-I (9)

Fundamentals of Object Oriented Programming: Programming paradigms, Basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP.

Basics of Java Language: Java language Features, Java Programming Structure, Java Tokens, JVM, Constants, Variables, Data types, Scope of variable, Type Casting, Operators and Expressions, Branching and looping statements, Arrays.

UNIT–II (9)

Classes and Objects: Defining a class, Field declaration, Method declaration, Creating object, Accessing Class Members, Constructors, garbage collection, Static members, Nested and inner classes, Command line arguments, Wrapper classes.

Inheritance: Extending a class, Defining subclasses, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Access controls, *this* and *super* keywords.

UNIT-III (9)

Polymorphism: Overloading methods, Overloading constructors, Overriding Methods, Dynamic method dispatch, Abstract classes, Final Keyword.

Interfaces: Defining an interface, Implementing interfaces, Nested Interfaces, Variables in interfaces, Extending interfaces

Packages: Packages, java API packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Adding a class to package, Hiding classes, Static Import.

UNIT–IV (9)

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Explicit exceptions with *throw, throws* and *finally* keywords.

String Handling: String constructors, String length, String operations, Character extraction, String comparison, Searching string, Modifying string, Changing string cases, Joining strings**.**

Using I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

[1] Herbert Schildt, *JAVA The Complete Reference*, 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465,2014.

[2] E.Balgurusamy, *Programming with JAVA a primer*, 5e Edition, McGraw-Hill Publication Ltd, ISBN: 9351343200,2014.

References Books:

P Radha Krishna, *Object Oriented Programming through JAVA*, Universities Press, ISBN: 9788173715723,2011.

[1] Herbert Schildt, *JAVA The Complete Reference*, McGraw-Hill Education India Pvt.Ltd , 9th Edition, ISBN: 9781259002465,2011.

[2] Kathy Sierra, Bert Bates, *Head First Java*, O'Reilly Publictions, 2nd Edition, ISBN-13: 978-0596009205.

[3] Uttam K.Roy, *Advanced JAVA Programming*, Oxford Publications; First edition, ISBN- 13: 978-0199455508.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1: demonstrate object oriented concepts and java programming features

CO2: solve computing problems using object orientation and inheritance concepts

CO3: use polymorphism, interfaces and Packages for effective object oriented programming

CO4: handle Exceptions and I/O operations in application development

Course Articulation Matrix (CAM): U18OE403A OBJECT ORIENTED PROGRAMMING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE403A.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO2	U18OE403A.2	2	2	2	1	2	1	-	-	2	1	2	1	2	2	2
CO3	U18OE403A.3	2	2	2	1	2	1	-	-	2	1	2	1	2	2	2
CO4	U18OE403A.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE403A		2	2	2	1	1	1	1	1	2	1	2	1	2	2	2

U18OE403B FLUID MECHANICS AND HYDRAULIC MACHINES

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1*: various Properties of fluids and fluid statics*
LO2*: application of Bernoulli's equation and dimensional analysis*
LO3*: flow through pipes and working principles of hydraulic turbines*
LO4*: performance of reciprocating and centrifugal pumps*

UNIT-I (9)

Fluid fundamentals: Classification of fluids, fluid properties - density, specific weight, specific gravity, specific volume, viscosity, capillarity, vapor pressure, compressibility, surface tension, cohesion and adhesion.

Fluid statics: Pascal's Law, hydrostatic Law, measurement of pressure, manometers, Piezo meter, U- tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, buoyancy, meta center, stability of floating and submerged bodies

UNIT-II (9)

Fluid dynamics: Classification of fluid flow, continuity equation in one, two and three dimensional flow, velocity potential and stream function, forces causing motion, Euler's equation of motion, Bernoulli's Equation, applications of Bernoulli's equation, venturi meter, orifice meter, pitot tube, linear momentum equation ,application of linear momentum equation to forces on pipe bend.

Dimensional analysis: Dimensional analysis by Rayleigh's method and Buckingham π's theorem, dimensionless numbers and model laws, Reynolds law and Froude's law.

UNIT-III (9)

Flow through pipes: Loss of head in pipes, expression for head loss due to major and minor losses in pipes, HGL and TEL lines, pipes in series and parallel, equivalent pipe.

Hydraulic turbines: Concept of impact jets, classification, head, losses and various efficiencies, Pelton turbines, components, velocity triangles, power and efficiencies, reaction turbines, Francis and Kaplan turbines, efficiencies and characteristics, unit quantities, specific speed, draft tube theory.

UNIT-IV (9)

Reciprocating pumps: Working of single and double acting pumps, work done and efficiencies, slip, negative slip, performance characteristics of pumps, air vessel.
Centrifugal pumps: Principle, components, work done and efficiency, pumps in series and in parallel, multi stage pumps, characteristics, cavitation and priming.

Text Books:

[1] P.N.Modi and S.M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulic Machines*, Standard Book House, Rajsons Publications Private Limited, 21thedn., 2017

Reference Books:

[1] R.K.Bansal, *Fluid Mechanics and Hydraulic Machines*, Periodicals PrivateLtd.,2018
[2] Victor Streeter and E. Benjamin Wylie, *Fluid Mechanics*, McGraw Hill, Singapore, 9thedn.,2017
[3] Frank M. White, *Fluid Mechanics*, Special Indian Edition, Tata McGraw Hill, New Delhi,2011.
[4] A.K. Jain, *Fluid Mechanics Including Hydraulic Machines*, Khanna Publications, *12th* edn, 2018.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):
On completion of this course, students will be able to
CO1 summarize fluid properties using fundamental laws of fluid statics
CO2: analyse fluid flows using Bernoulli's equation and model laws
CO3: estimate losses in pipes and characterize hydraulic turbines
CO4: discuss the working principle and characteristics of pumps

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Articulation Matrix (CAM): U18OE403B FLUID MECHANICS AND HYDRAULIC MACHINES															
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE403B.1	2	1	-	-	-	-	-	-	1	1	-	1	1	-	-
CO2	U18OE403B.2	2	1	-	1	-	-	-	-	1	1	-	1	1	-	-
CO3	U18OE403B.3	2	1	-	1	-	-	-	-	1	1	-	1	1	-	-
CO4	U18OE403B.4	2	1	-	1	-	1	-	-	1	1	-	1	1	-	-
U18OE403B		2	1	-	1	-	1	-	-	1	1	-	1	1	-	-

U18OE403C MECHATRONICS

Class: B.Tech. IV-Semester **Branch:** Common to all Branches

TeachingScheme : **Examination Scheme:**

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Outcomes (LOs):
This course will develop students' knowledge in /on
LO1: *role of mechatronics based technology, sensors and transducers used in industry*
LO2: *various types of actuation systems, working principles and their applications*
LO3: *mathematical models for various types of systems*
LO4: *various transfer functions and control modes*

UNIT-I (9)

Introduction to Mechatronics: Measuring system, Control systems, Microprocessor based controllers. Mechatronics approach.
Sensors and Transducers: Performance, terminology. displacement, position, proximity, velocity and motion.

UNIT-II (9)

Actuation Systems: working principles of pneumatic and hydraulic systems, directional control valves, pressure control valves, process control valves and rotary actuators.
Electrical Actuation Systems: working principles of electrical system, mechanical switches, solid-state switches solenoids, DC motors, AC motors and stepper motors.

UNIT-III (9)

Basic Models: Mathematical models, mechanical system building blocks, electrical system building blocks, fluid system building blocks and thermal system building blocks.
System Models: Engineering system, rotational-translational system and electro- mechanical systems and hydraulic-mechanical system.

UNIT-IV (9)

System Transfer functions: Transfer function, first order system, second order system, system in series and systems with feedback loops.
Closed Loop Controllers: Continuous and discrete processes. Control modes. Two step mode and proportional mode. Derivative control, integral control, PID controller, digital controllers, velocity controllers and adaptive control.

Text Book:

1. Bolton W., *Mechatronics*, *Pearson Publications,* 6/e, ISBN: 9788131732533, 2015.

Reference Books:

1. Nitaigour Premchand Mahalik, *Mechatronics: Principles Concepts and Applications*, *Tata McGraw Hill, 2/e,* ISBN-13: 978-0070483743,2017.
2. HMT, *Mechatronics*, Tata McGraw-Hill, ISBN9788415700272 New Delhi,2000.
3. Devdas Shetty, Richard and Kilk, *Mechatronics System and Design*, Cenage Learning, Inc. 2/e, ISBN-13: 978-1439061985,2010.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1 apply the mechatronics approach ad select suitable sensors and transducers for a given application

CO2: explain working principles of mechanical, hydraulic, pneumatic and electrical actuators and their applications

CO3: develop basic building blocks for mechanical, electrical, fluid and thermal systems and build mathematical models and analyze

CO4: explain various system transfer functions and select an appropriate closed loop controller for a given application

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Articulation Matrix (CAM): U18OE403C MECHATRONICS																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE403C.1	2	2	1	-	2	2	-	-	-	1	-	1	1	-	1
CO2	U18OE403C.2	2	2	1	-	2	-	-	-	-	1	-	1	1	-	1
CO3	U18OE403C.3	2	2	1	3	2	-	-	-	-	1	-	1	1	-	-
CO4	U18OE403C.4	2	2	1	1	2	-	-	-	-	1	-	1	1	-	1
U18OE403C		2	2	1	2	2	2	-	-	-	1	-	1	1	-	1

U18OE403D WEB PROGRAMMING

Class: B.Tech. IV-Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3		-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: designing static webpage using HTML Tags, CSS properties, interactivity with JavaScript
LO2: creating dynamic webpage using JSP.
LO3: developing server-side scripts for web applications using PHP.
LO4: building databases applications using PHP, MYSQL and XML.

UNIT-I (9)

HTML: Document Structure, Basic Tags, Creating Headings, Working with Links, Creating Paragraph, Working with Images, Tables, Frames. Introduction to Forms and Controls: Creating HTML Form, Specifying Action URL and Method to Send the Form, Using HTML Controls.

CSS: *CSS* (Cascading style sheet) rules and properties, Types: Inline, External and Internal Style Sheets, Style Classes, Multiple Styles.

JAVASCRIPT: JavaScript syntax, Embedding JavaScript in HTML Page. Usage of variables, Working with Operators, Control-Flow Statements, Functions and Array, Creating Objects, Handling Events.

UNIT-II (9)

JSP: Syntax and Semantics, JSP Development Model, Components of JSP page: Directives, Comments, Expressions, Scriptlets, Declarations, Implicit Objects, Standard Actions, Tag Extensions, A Complete JSP Example. Session and Thread Management: Session Tracking, Session API, Thread Management. Application Event Listeners.

JDBC: Database access with JDBC, Overview, JDBC drivers, connecting to database with Driver Manager, Statement Interfaces: Statement, Prepared statement, Callable statement, Result Sets.

UNIT-III (9)

Introduction to PHP: Overview of PHP, Advantages of PHP over scripting languages, Creating and running a PHP script, handling errors. Working with Variables and Constants: Variables, Data Types and Operators. Controlling Program Flow: Conditional Statements, Looping Statements, Break, Continue and Exit Statements. Working with Functions, Arrays, Files and Directories.

Working with Forms: Web Forms and Form Elements, Processing a Web Form, Validating a Web Form.

UNIT-IV (9)

Database using PHP: Exploring Relational Database Model, Records and Primary Keys. Working with SQL Statements. Using PHP and MySql: Checking Configuration, Connecting to

Database, Selecting a Database, Adding and Altering a Table in a Database, Inserting and modifying Data in a Table, Retrieving Data from a Table.

XML : Introduction to XML, XML Basics: Syntax, Declaration, Elements, Attributes, Valid XML Documents, Viewing XML, XML Parser, XML Technologies, Document Object Model(DOM).

Text Books:

[1] Kogent, *Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML*, 1st Edition, Dreamtech Press (Black Book), ISBN-13:9789351192510,2013.

[2] Phil Hanna, *JSP: The Complete Reference*, 2nd Edition, McGraw-Hill, ISBN: 007-212768-6,2001

Reference Books:

[1] Ivan Bayross, *Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP*, 4th Edition, BPB Publications, ISBN-13: 978-8183330084, 2009

[2] UttamK.Roy, *Web Technologies*, 7thEdition, Oxford Higher Education, ISBN-10: 0-19-806622-8, ISBN-13: 978-0-19-806622-4,2010

[3] Luke Welling, Laura Thomson, *PHP and MySQL Web Development*, 3rdEdition, Sams Publications, ISBN: 0-672-32672-8,2005

[4] Jayson Falkner, Kevin Jones, *Servlets and Java Server Pages*, 1stEdition, Pearson, ISBN: 0-321-13649-7, 2003

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1 create static web pages using HTML Tags, CSS properties and Java scripts

CO2: create dynamic web pages using java server page concepts

CO3: develop web server side applications using PHP concepts

CO4: develop enterprise databases for web-based applications using PHP and MySQL

Course Articulation Matrix (CAM): U18OE403D WEB PROGRAMMING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE403D.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO2	U18OE403D.2	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO3	U18OE403D.3	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO4	U18OE403D.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE403D		2	2	2	1	2	1	1	1	2	1	2	1	2	2	2

U18OE403E MICROPROCESSORS

Class: B.Tech., IV-Semester
Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: Common to all branches
Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam:	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on
LO1*: architectural issues of 8086 Microprocessor*
LO2*: programming concepts of 8086 Microprocessor*
LO3*: interfacing of 8086 microprocessor to various I/O subsystems.*
LO4: *serial data communication types and standards like RS232, IEEE 488 Bus.*

UNIT – I (9)

Review of 8085 MPU Architecture
8086 Family Architecture: Organization of 8086 CPU, Concept of Memory Segmentation, Segment Registers, Physical and Logical Addressing, Addressing Modes and Instruction Formats, Instruction Set**.**

UNIT – II (9)

Assembly Language Programming: Assembler Directives, Simple Programming of 8086, Arithmetic, Logical and Data Processing Programs; Implementation of Control Loops, Structures, Strings, Procedures, Macros.
Pin Configuration, Minimum / Maximum Modes, Timing Diagrams, Delay Subroutines.

UNIT – III (9)

Interfacing with 8086: 8086 Interrupts, Interrupt Service Routines, Programmable Interrupt Controller 8259, Programmable Peripheral Interface 8255, Interfacing of Switches, Keyboards, LEDs, Stepper Motor, ADCs and DACs.

UNIT – IV (9)

DMA Controller 8257, Programmable Timer/Counter 8254.
Serial Data Communication through 8086: Types of Serial Communication, Synchronous and Asynchronous Communication, Serial Data Communication through USART 8251, Serial Data Communication Standards, RS-232, IEEE 488 Bus (GPIB).

Text Books:

[1] D.V.Hall, *Microprocessors and Interfacing: Programming & Hardware*, 2nd Edition, Tata McGraw Hill, New Delhi, 1992. (Chapter 3 to 10)

[2] Yuchang Liu, Glen A. Gibson, *Microcomputer Systems. The 8086/8088 Family, Architecture, Programming and Design,* 2nd Edition, PHI, New Delhi, 1995. (Chapter 2 to 11)

Reference Books:

[1] Kenneth J. Ayala,Ayala Kenneth, *The 8086 Microprocessor: Programming and Interfacing The PC*, West Pub., 1994.

[2] Barry B. Brey," *The Intel Microprocessors: Architecture, Programming and Interfacing*", 2nd Edition, PHI, New Delhi, 1998.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1 describe the architecture of 8086 microprocessor and explain instructions with suitable examples

CO2: write Assembly Language Programs (ALPs) to perform a given task

CO3: design 8086 microprocessor based system for given specifications with memory mapping

CO4: explain serial communication modes and discuss it standards

Course Articulation Matrix (CAM): U18OE403E MICRO PROCESSORS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE403E.1	3	3	2	1	-	-	-	-	-	-	-	-	2	2	1
CO2	U18OE403E.2	3	2	2	1	-	-	-	-	-	-	-	-	2	2	1
CO3	U18OE403E.3	3	3	2	1	-	-	-	-	-	-	-	-	2	2	1
CO4	U18OE403E.4	3	3	2	1	-	-	-	-	-	-	-	1	2	2	1
U18OE403E		3	2.75	2	1	-	-	-	-	-	-	-	1	2	2	1

U18OE403F STRENGTH OF MATERIALS

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: behavior of bodies subjected to various types of stresses and strains

LO2: shear force and bending moment for determinate beams

LO3: bending and shearing stresses for beams in flexure

LO4: behavior of circular shafts, springs and thin cylinders

UNIT-I (9)

Simple stresses and strains: Types of stresses, strains, stress–strain diagram, elastic limit, Hooke's law, bars of varying sections, uniformly tapering circular and rectangular sections, elongation of bars due to self weight, temperature stresses in uniform bars.

Elastic modulii: Elastic constants, longitudinal strain, lateral strain, Poisson's ratio, complimentary shear stress, state of simple shear, modulus of elasticity (E), modulus of rigidity (N), bulk modulus (K), relation between E, N & K, strain energy, resilience, impact loading.

UNIT-II (9)

Principal stresses: Definition, normal and shear stress, principal stresses, principal planes and their graphical representation by Mohr's circle.

Shear force and bending moment: Types of supports, classification of beams, concept of shear force and bending moment, shear force diagram and bending moment diagram for simply supported, cantilever and overhanging beams, loading from shear force and bending moment diagram, principle of superposition.

UNIT-III (9)

Bending stresses in beams: Assumptions, theory of simple bending, application of bending equation and calculation of bending stresses in beams of homogeneous and flitched beam material, beams of uniform strength.

Shearing stresses in beams: Shearing stress due to bending, variation of flexural shear stress distribution across rectangular, triangular, circular, flanged section, shear resilience.

UNIT-IV (9)

Circular shafts and springs: Theory of pure torsion in solid and hollow circular shafts, shear stresses, angle of twist, power transmitted by shaft, close-coiled and open-coiled helical spring subjected to axial load and axial twist, springs in series and parallel.
Thin cylinders: Analysis of thin walled pressure vessels, hoop stress, longitudinal stress.

Text Books:

[1] Rajput R.K., *Strength of Materials*, 7th Edition, S Chand and Company

[2] Gunneswara Rao T. D., MudimbyAndal, *"Strength of Materials"*, 1st ed. 2018, Cambridge University Press.

Reference Books:

[1] Timoshenko and Gere, *Mechanics of Materials*, 1st Edition Mc Graw Hill International.
[2] Punmia B.C., Arun K. Jain, Ashok K. Jain, *Mechanics of Materials*, 2nd Edition,Laxmi Publications, New Delhi.
[3] Subramanian R., *Strength of Materials*, 3rd Edition, Oxford University Press.
[4] Ramamrutham S., *Strength of Materials, 2nd Edition,* Dhanpat Rai & Sons, New Delhi

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):
On completion of this course, students will be able to
CO1 estimate various types of stresses and strains
CO2: construct Mohr's circle, shear force and bending moment diagrams for determinate beams
CO3: determine the bending and shearing stresses for beams subjected to pure bending
CO4: analyze stresses in thin cylinders, circular shafts and springs by theory of pure torsion

Course Articulation Matrix (CAM): U18OE403F STREANGTH OF MATERIAL

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE403F.1	2	2	1	1	-	-	-	-	-	1	-	2	1	-	-
CO2	U18OE403F.2	2	2	1	-	-	-	-	-	-	1	-	1	1	-	-
CO3	U18OE403F.3	2	2	1	1	-	-	-	-	-	-	-	1	-	-	-
CO4	U18OE403F.4	2	2	1	2	-	-	-	-	-	1	-	1	1	-	-
U18OE403F		2	2	1	1.33	-	-	-	-	-	1	-	1.25	1	-	-

U18CN404 THEORY OF COMPUTATION

Class: B.Tech. IV-Semester

Branch: Computer Science and Engineering(Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: formal notation for languages, finite automata and regular expressions

LO2: closure properties of regular languages, types of grammars and simplification of context-free grammar

LO3: normal forms for context-free grammars and equivalence of pushdown automata

LO4: turing machine, undecidable problems about turing machines and post's correspondence problem

UNIT – I (9)

Automata Theory: Introduction to finite automata, Structural representations and the central concepts of automata theory

Finite Automata: Deterministic finite automata, Non-deterministic finite automata, Finite automata with epsilon-transitions, Finite automata with output

Regular Expressions and Languages: Regular expressions, Finite automata and regular expressions, Applications of regular expressions, Regular sets and regular grammars

UNIT – II (9)

Properties of Regular Languages: Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of automata

Context-free Grammars and Languages: Chomsky classification of languages, Context-free grammars, Parse trees, Applications of context-free grammars, Ambiguity in grammars and languages, Simplification of context-free grammars

UNIT – III (9)

Properties of Context-free Languages: Normal forms for context-free grammars, Pumping lemma for context-free languages, Closure properties of context-free languages, Decision properties of context-free languages

Pushdown Automata: Definition of the pushdown automaton, Deterministic pushdown automata, Languages of pushdown automata, Equivalence of pushdown automata and context- free grammar

UNIT – IV (9)

Introduction to Turing Machines: Problems that computers cannot solve, Turing machine, Programming techniques for turing machines, Extensions to the basic turing machine Undecidability: A language that is not recursively enumerable, An undecidable problem that is recursively enumerable, Undecidable problems about turing machines, Post's correspondence problem, Classes P & NP, NP-complete problem

Text Book:

[1] E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, *Introduction to Automata Theory, languages and Computation*, 3rd ed. Hong Kong: Pearson Education Asia, 2007.

Reference Books:

[1] Mishra K. L. P, Chandrasekaran N, *Theory of Computer Science: Automata, Languages and Computation*, 3rd ed. New Delhi: PHI, 2012.

[2] Harry R. Lewis, Christos H. Papadimitriou, *Elements of the Theory of Computation*, 2nd ed. Hong Kong: Pearson Education Asia, 1998.

[3] chael Sipser, *Introduction to the Theory of Computation*, 3rd ed. Boston: Cengage Learning, 2012.

[4] John Martin, *Introduction to Languages and the Theory of Computation*, 3rd ed. New York: McGraw-Hill, 2007.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: build formal notation for languages, finite automata and regular expressions

CO2: simplify the given context-free grammar and prove the given language is not regular

CO3: construct the given context-free grammar into chomsky normal form or greibach normal form and design pushdown automata for the given language

CO4: design turing machine and examine whether the given post's correspondence problem has a solution or not

U18CN405R22 DATABASE MANAGEMENT SYSTEMS

Class: B.Tech. IV- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: diverse issues involved in the design and implementation of a database management system

LO2: study the physical and logical database designs and different database models

LO3: distinct normalization techniques on database systems and query optimization techniques

LO4: database structure and build up essential DBMS concepts like database security, data integrity and concurrency control

UNIT – I (9+3)

Databases and Database Users: Introduction, Characteristics of the database approach, Actors on the scene, Workers behind the scene, Advantages of using a DBMS, When not to use a DBMS

Database System Concepts and Architecture: Data models, Schemas and instances, Three-schema architecture and data independence, Database languages and interfaces, The database system environment, Classification of database management systems

The Relational Data Model, Relational Database Constraints: Relational model concepts, Relational constraints and the relational database schemas, Update operations and dealing with constraint violations

Basic SQL: SQL Data definition and data types, Specifying constraints in SQL, Basic retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL

NOSQL Databases: Introduction to NOSQL systems

UNIT - II (9+3)

Data Modeling using the Entity-Relationship Model: Using high-level conceptual data models for database design, Entity types, Entity sets, Attributes and keys, Relationships types, Relationship sets, Roles and structural constraints, Weak entity types, ER diagrams

Enhanced Entity-Relationship: Sub classes, Super classes and Inheritance, Specialization and generalization, Constraints and characteristics of specialization and generalization hierarchies, Modeling of union types using categories

Relational Database Design by ER and EER-to-Relational Mapping: Relational database design using ER-to-Relational mapping, Mapping EER model constructs to relations

UNIT - III (9+3)

Database Design Theory and Normalization: Informal design guidelines for relation schemas, Functional dependencies, Normal forms based on primary keys, General definitions of second and third normal forms, Boyce-Codd normal form,

Algorithms for relational database schema design, Multivalued dependency and fourth normal form , Join dependencies and fifth normal form

The Relational Algebra and Relational Calculus: Basic relational algebra operations, Examples of queries in relational algebra, The tuple relational calculus, The domain relational calculus

Query Processing and Optimization: Translating SQL queries into relational algebra, Using heuristics in query optimization

UNIT - IV (9+3)

Introduction to Transaction Processing Concepts and Theory: Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions, Characterizing schedules based recoverability, Characterizing schedules based on serializability

Concurrency Control Techniques: Two-Phase locking techniques for concurrency control, Concurrency control based on timestamp ordering

Database Recovery Techniques: Recovery concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery techniques based on immediate update, Shadow paging

Database Security and Authorization: Introduction to database security issues, Discretionary access control based on granting and revoking privileges, Mandatory access control and role-Based access control for multilevel security

Text Books:

[1] RamezElmasri, Shamkanth B. Navathe, *Fundamentals of Database Systems*, 7th ed., New Delhi: Pearson Education, 2017

Reference Books:

[1] Raghu Ramakrishnan, Johannes Gehrke, *Database Management Systems*, 4th ed., New Delhi: Mc-Graw Hill, 2014

[2] Abraham Siberschatz, Henry F. Korth, and S. Sudarshan, *Database System Concepts*, 6th ed., New Delhi: McGraw-Hill, 2011

[3] R. P. Mahapatra, Govind Verma, *Database Management Systems*, 1st ed., New Delhi: Khanna publications, 2016

[4] Thomas Connolly, Carolyn Begg, *Database Systems*, 3rd ed., Chennai: Pearson Education, 2003

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: analyze the schema, illustrate the relational data model and consistency constraints effectively, and develop effective queries
CO2: design the database with an ER and EER models
CO3: apply the normalization on database to eliminate redundancy and query optimization techniques to determine the most efficient way to execute a query plans
CO4: illustrate the multi-level security, correctness of data and control over access on database

Course Articulation Matrix (CAM): U18CN405R22 DATABASE MANAGEMENT SYSTEMS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN405R22.1	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
CO2	U18CN405R22.2	2	2	2	2	1	-	-	-	-	1	-	2	3	1	3
CO3	U18CN405R22.3	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
CO4	U18CN405R22.4	2	2	2	2	1	-	-	-	-	1	-	2	3	1	2
U18CN405R22		2	2	2	2	1	-	-	-	-	1	-	2	2.5	1	2.25

U18CN406R22 COMPUTER NETWORKS

Class: B.Tech. IV- Semester **Branch:** Computer Science and Engineering(Networks)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: introduction to computer networks and reference models
LO2: types of data link and medium access control protocols
LO3:routing algorithms, congestion control algorithms and internetworking
LO4: transport and application layer protocols used in the networks

UNIT – I (9+3)

Introduction: Uses of computer networks, Network hardware, Network software
Reference Models: OSI reference model, TCP/IP reference model, Comparison of OSI and TCP/IP reference model
Physical Layer: Transmission media - Guided transmission media, Wireless transmission, Communication satellites; Digital modulation and multiplexing
Switching: Circuit and Packet switching

UNIT - II (9+3)

Data Link Layer: Data link layer design issues, Error detection and correction, Elementary data link protocols, Sliding window protocols
Medium Access Control Sub Layer: Channel allocation problem, ALOHA, Carriers sense multiple access, Collision free protocols, Limited contention protocol, IEEE standard 802.3, Token bus, Token ring, Switched ethernet, Fast ethernet, Gigabit ethernet, Data link layer switching

UNIT - III (9+3)

Network Layer: Network layer design issues, Routing algorithms - Optimality principle, Shortest path algorithm, Flooding, Distance vector routing, Link state routing, Hierarchical routing, broadcast routing, Multicast routing
Congestion Control Algorithms: Approaches to congestion control, Traffic aware routing, Admission control, Traffic throttling, Load shedding
Internetworking: How networks differ, How networks can be connected, Tunneling, Internetwork routing, Packet fragmentation

UNIT - IV (9+3)

Network Layer in The Internet: IP version 4 protocol, IP addresses, IP version 6 protocol, Internet control protocols, OSPF – Interior gateway routing protocol, BGP – Exterior gateway routing protocol, Internet multicasting
Transport Layer: Transport services, Elements of transport protocols – Connection establishment and release, Error control and flow control, Crash recovery, Multiplexing congestion control; Internet transport protocols - UDP, TCP
Application Layer: Domain name system (DNS), Electronic mail, World Wide Web

Text Book:

[1] Andrew S.Tannenbaum, David J.Wetherall, *Computer Networks*, 5th Edition Pearson Education, ISBN-13: 978-0-13-212695-3, 2013

Reference Books:

[1] William Stallings, *Data and Computer Communication*, 10th Edition, London: Pearson Education, 2014
[2] Behrouz Forouzan, "Data Communication and Networking", *5th Edition, Tata McGraw Hill* , ISBN: 978-0-07-296775-3, 2012
[3] Larry Peterson, Bruce S Davie, *Computer Networks*, 5th ed. New York: Elsevier Inc., 2011
[4] James F. Kurose and Keith W. Ross, *Computer Networking A Top-Down Approach*, 6th ed. London:Pearson Education, 2013

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1:make use of OSI & TCP/IP reference models for data transmission
CO2: analyze different types of data link & medium access control protocols
CO3: examine routing algorithms, congestion control algorithms and internetworking
CO4: analyze the different services of transport and application layer protocols

Course Articulation Matrix (CAM): U18CN406R22 COMPUTER NETWORKS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18CN406R22.1**	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO2	**U18CN406R22.2**	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO3	**U18CN406R22.3**	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO4	**U18CN406R22.4**	1	2	2	1	1	1	-	1	1	1	-	1	2	2	2
U18CN406R22		1.75	2	2	1.75	1.75	1	-	1	1	1	-	1	2	2	2

U18CN407R22 DATABASE MANAGEMENT SYSTEMS LABORATORY

Class: B.Tech. IV-Semester Branch: Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: implementing the basic SQL queries related to DDL, DML, TCL and DCL constructs using Oracle
LO2: implementing the SQL queries related to functions, joins, indexes, sequences and user defined data types
LO3:implementing PL/SQL programs using PL/SQL block, cursors, parameterized cursors, and exceptions
LO4:implementing PL/SQL programs using stored procedures

LIST OF EXPERIMENTS

Structured Query Language (SQL):

Experiment-I

1. Design and implement DDL,DML, TCL and DCL commands
2. Design and implement Queries on types of constraints

Experiment -II

1. Design and implement Queries using built-in functions of NUMBER, CHARACTER and DATE Data types
2. Design and implement Queries on Data type conversion functions

Experiment -III

1. Design and implement Queries on single row functions and operators

Experiment -IV

1. Design and implement Queries on aggregate functions

Experiment -V

1. Design and implement Queries on joins and nested queries

Experiment -VI

1. Construct SQL statements to create simple, composite indexes, user-defined data types, views, sequences

PL/SQL Programs:

Experiment –VII

1. Implementation of sample PL/SQL programs using conditional and iterative statements

Experiment -VIII

1. Implementation of PL/SQL programs using cursors

Experiment -IX

1. Implementation of PL/SQL programs using parameterized cursors

Experiment-X

1. Create PL/SQL programs to handle exceptions

Experiment –XI

1. Create PL/SQL programs using stored procedures and functions

Experiment -XII

1. Create PL/SQL programs using packages

Experiment -XIII

1. Create PL/SQL programs using Triggers

Laboratory Manual:

[1] *Database Management Systems Laboratory Manual,* Dept. of CSE (Networks), KITS Warangal.

Reference Books:

[1] Ivan Bayross, *SQL,PL/SQL: The Programming Language of Oracle,* 4th*ed.*NewDelhi:BPB publications,2010.
[2] P.S. Deshpande, *SQL & PL/SQL for Oracle 11g Black Book,*NewDelhi: Wiley Publisher, 2011.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…
CO1: develop sql queries using the concepts related to DDL, DML, TCL and DCL constructs of Oracle
CO2:illustrate the SQL queries related to functions, joins, indexes, sequences and views
CO3: develop SQL queries using the PL/SQL programs and cursors
CO4:create PL/SQL including stored procedures, stored functions, cursors and packages

Course Articulation Matrix (CAM): U18CN407R22 DATABASE MANAGEMENT SYSTEMS LABORATORY

COURSE OUTCOME		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN407R22.1	2	2	2	2	2	-	-	-	1	1	-	2	2	1	2
CO2	U18CN407 R22.2	2	2	2	2	2	-	-	-	1	1	-	2	2	1	2
CO3	U18CN407 R22.3	2	2	2	2	2	-	-	-	1	1	-	2	2	1	3
CO4	U18CN407 R22.4	2	2	2	2	2	-	-	-	1	1	-	2	3	1	3
U18CN407R22		2	2	2	2	2	-	-	-	1	1	-	2	2.25	1	2.5

U18CN408R22 COMPUTER NETWORKS LABORATORY

Class: B.Tech. IV- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: *network diagrams, building LAN networks, communication with TCP, UDP using socket programming*

LO2: *the traffic flow and the contents of protocol frames, error detection techniques*

LO3: *routing techniques, congestion control mechanism*

LO4: *conduct computer communication network simulations, packet analysis*

List of Experiments

Experiment-I

1. Draw the network diagrams of a campus network

a) Study of system administration, network administration and identify the responsibilities of a network engineer and network administrator

b) Draw symbols of devices and connectors used in network diagrams

c) Illustrate network diagram of different network topologies

d) Illustrate network diagram of different network types (LAN, MAN, WAN)

e) Illustrate physical and logical diagrams of a campus network

Experiment-II

2. Build a LAN network and check network connectivity

a) Identify different Ethernet cable categories and write down the detailed specifications

b) Identify different devices, tools, connectors used in establishing a physical LAN network

c) Perform crimping operation for straight through cable and crossover cable

d) Configure an IP address on a computer and verify using command

e) Establish a LAN network with two computers and check network connectivity between two computers using Ping command

Experiment-III

1. Study of socket programming and implement a socket
2. Develop a socket program to implement date and time display from client to server using TCP
3. Develop a socket program to implement date and time display from client to server using UDP

Experiment-IV

1. Develop a socket program to implement chat application using TCP
2. Develop a socket program to implement chat application using UDP

Experiment-V

1. Develop a java program to implement stop and wait protocol
2. Develop a java program to implement sliding window protocol

Experiment-VI

1. Develop a java program for file transfer using TCP sockets
2. Develop a program for error detection code using CRC-CITTT (16-bits)
3. Develop a java program to find subnet mask and networked for given IP address

Experiment-VII

1. Develop a java program that resolves IP address from a given domain name
2. Develop a java program for SNMP application

Experiment-VIII

1. Develop a java program for simulating ARP and RARP protocols

Experiment-IX

2. Develop a program to implement distance vector routing

Experiment-X

1. Implementing simulations using NS3 (introduction)
   a. Study of network simulation tool NS3
   b. create nodes and connect nodes

Experiment-XI

2. Implementing simulations using NS3
   a. simulate a simple network
   b. simulate to find number of packets dropped due to congestion

Experiment-XII

3. Demonstration of Wireshark packet analyzer tool.
   a. Capture a HTTP packet
   b. View the captured packet
   c. Apply filters
   d. Analyze the packet

Laboratory Manual:

[1] *Computer Networks Laboratory manual*, prepared by the faculty of Dept. of CSE (Networks).

Text Books:

[1]*Computer Networks*, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

[2] W. Richard Stevens, *UNIX Network Programming – Networking APIs: Sockets and XTI*, Vol. 1, Second Edition, Prentice Hall, 1998.

[3] Eitan Altman, Tania Jimenez, *NS Simulator for Beginners*, Morgan & Claypool Publishers, 2011.

[4] Wireshark User's Guide: Version 3.5.0

Reference Book:

[1] Jack L. Burbank, *An Introduction to Network Simulator 3*, First Edition, Wiley-Blackwell, 2015

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: build network design and LAN networks, implement socket programming with TCP, UDP
CO2: apply data link layer framing methods, error detection and error correction codes
CO3: create network routes, congestion control in network design
CO4: develop network simulations, packet analysis using network tools

Course Articulation Matrix (CAM):U18CN408R22 COMPUTER NETWORKS LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN408R22.1	2	2	2	2	2	-	-	-	2	1	-	1	2	2	2
CO2	U18CN408R22.2	2	2	1	1	2	-	-	-	1	1	-	1	2	2	3
CO3	U18CN408R22.3	2	2	1	2	3	-	-	-	2	1	-	1	2	3	3
CO4	U18CN408R22.4	2	2	2	2	3	-	-	-	2	1	-	1	2	2	3
U18CN408R22		2	2	1.50	1.75	1.75	-	-	-	1.75	1	-	1	2	2.25	2.75

U18OE411A OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B.Tech. IV- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…
LO1: *implementing concepts of object oriented programming*
LO2: *debug and test java applications effectively*
LO3: *effective use of exception handling, interfaces and packages during applications development*
LO4: *I/O and applet programming in java*

List of Experiments

Experiment-I

1. Write a program to demonstrate operators of java
2. Write a program to demonstrate type casting and operator precedence
3. Write a program to demonstrate different types of if-statements
4. Write a program to demonstrate switch-case.

Experiment-II

a. Write a program to demonstrating loop control statements.
b. Write a program to demonstrate for-each control loop.
c. Implement programs using single dimensional arrays.
d. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment-III

a. Write a program to demonstrate creating object to a class for accessing variables and methods.
b. Write a program to demonstrate creating multiple object.
c. Write a program to demonstrate passing objects to methods.
d. Write a program to demonstrate constructor and garbage collector by invoking it explicitly.

Experiment-IV

1. Write a program to demonstrate static members.
2. Write a program to demonstrate command line argument.
3. Write a program to demonstrate variable length argument.
4. Write a program to demonstrate wrapper classes.

Experiment-V

1. Write a program to demonstrate inheritance using extends keyword.
2. Write a program to demonstrate multilevel inheritance.
3. Write a program to demonstrate hierarchical inheritance.
4. Write a program to demonstrate access controls.

Experiment-VI

1. Write program to demonstrate *this* and *supper* keywords.
2. Write program to demonstrate dynamic method dispatch.
3. Write a program to demonstrate final variable and methods.
4. Write a program to demonstrate use of abstract class.

Experiment-VII

1. Write a program to define an Interface and implement it into a class.
2. Write a program to implement multiple interfaces into single class.
3. Write a program to extend interfaces.
4. Write a program to implement nested interfaces.

Experiment-VIII

1. Write a program to create a package, and demonstrate to import a package to a class.
2. Write a program to demonstrate access protection of packages.
3. Write a program to demonstrate static import of package.

Experiment-IX

1. Write a program to demonstrate *try* and *catch* statement for exception handling
2. Handle *Array Index Of Bounds Exception*, *Number Format Exception* and *Divide By Zero Exception* using multiple catch blocks.
3. Write a program to demonstrate user defined exception with *throw keyword*
4. Write a program to demonstrate *finally* block.

Experiment-X

1. Write a program to demonstrate string handling functions.
2. Write a program to demonstrate string searching functions.
3. Write a program to demonstrate string comparison functions.
4. Write a program to demonstrate string modification functions.

Experiment-XI

1. Write a program to demonstrate reading and writing input using byte stream classes
2. Write a program to demonstrate reading and writing input using character stream classes
3. Write a program to demonstrate data input and output streams
4. Write a program to demonstrate array input and output streams

Experiment-XII

1. Write a program to create a file using byte stream classes
2. Write a program to create a file using character stream classes
3. Write a program to open the specific file
4. Write a program to copy the content of one file to another.

Laboratory Manual:

[1] *Java Programming laboratory manual*, prepared by faculty of Dept. of CSE (Networks)

Reference Book:

[1] Herbert Schildt,"*JAVA The Complete Reference*", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465, 2014.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: implement OOP concepts using Java
CO2: use the concepts like inheritance, polymorphism, packages and interfaces in application development
CO3: handle runtime exceptions in object oriented programming
CO4: build effective I/O interfaces for software applications

Course Articulation Matrix (CAM):U18OE411A OBJECT ORIENTED PROGRAMMING LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN411A.1	2	2	2	1	-	-	-	-	-	1	-	-	2	1	2
CO2	U18CN411A.2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
CO3	U18CN411A.3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
CO4	U18CN411A.4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN411A		2	2	2	1		-	-	-	-	1	-	2	2	1	2.75

U18OE411B FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Class: B.Tech. IV- Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: *determining the hydraulic coefficient for various flow measuring devices*

LO2: *implementing Bernoulli's equation and application of Bernoulli's theorem in estimating various losses in pipe*

LO3: *studying the various parameters which effects the impact of jet*

LO4: *studying the characteristics of hydraulic machines*

List of Experiments

1. Determination of Coefficient of Discharge for given Orifice meter and Venturi meter.
2. Determination of Coefficient of Discharge for given notches (triangular/rectangular)
3. Determination of Coefficient of Discharge for given orifice and mouth piece.
4. Verification of Bernoulli's theorem.
5. Estimation of coefficients of various head losses in pipes due to major and minor losses (sudden enlargement, sudden contraction and bend).
6. Determine of Reynolds's number using Reynolds's apparatus.
7. Determination of coefficient of impact for a jet on given vane.
8. Determination of performance characteristics of Francis Turbine
9. Determination of performance characteristics of Pelton Wheel.
10. Determination of performance characteristics of Centrifugal Pump.
11. Determination of performance characteristics of Submersible Pump.
12. Determination of performance characteristics of Reciprocating Pump.

Laboratory Manual:

[1] *Fluid Mechanics Laboratory Manual*, prepared by the faculty of Department of Civil Engineering.

Reference Books:

[1] N. Kumara Swamy, *Fluid Mechanics and Machinery Laboratory Manual,* Charotar Publishing House Pvt., Ltd., 1st edn.,2008.

[2] Sarbjit Singh, *Experiments in Fluid Mechanics*, PHI Learning Private Limited, New Delhi,2009

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: determine the hydraulic coefficient for various flow measuring devices
CO2: apply Bernoulli's equation in estimating head loss in pipes
CO3: apply the principles of impact of jet on different vanes
CO4: demonstrate the characteristics of hydraulic machines

Course Articulation Matrix (CAM):U18OE411B FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE411B.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
CO2	U18OE411B.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
CO3	U18OE411B.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
CO4	U18OE411B.4	2	1	-	1	-	-	-	-	1	1	-	1	2	-	-
U18OE411B		2	1	-	1	-	-	-	-	1	1	-	1	2	-	-

U18OE411C MECHATRONICSLAB

Class: B.Tech. IV- Semester **Branch:** Mechanical Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…
LO1: *basic elements underlying mechatronic systems: analog electronics, digital electronics, sensors, transducers, actuators, microcontrollers and embedded software*
LO2: *interface of various systems to a PLC*
LO3: *integration of various systems through programming*
LO4: *design and simulation of hydraulic and pneumatic circuits*

LIST OF EXPERIMENTS

1. Controlling A.C. Non servomotor clockwise and anti clockwise with time delay.
2. Controlling A.C. Non servo motor using digital inputs proximity sensors.
3. Controlling of Single acting Pneumatic Cylinder with time delay
4. Controlling of double acting Pneumatic Cylinder with time delay and sequencing
5. Control of D.C servomotor (rotating table clockwise and counterclockwise)
6. Integration of AC Non servo motors, single acting pneumatic cylinder and double acting pneumatic cylinder.
7. Integration of AC Non- servomotor and pneumatic cylinders with digital inputs.
8. Controlling of X table and Y table.
9. Controlling of various systems using manual inputs.
10. Controlling of traffic lights with time delay.
11. Controlling of lift operations with time delay
12. Hydraulic and Pneumatic simulation

Laboratory Manual:

[1] *Mechatronics Lab Manual,* prepared by faculty of Mechanical Engineering, KITSW

Reference Books:
[1] ATS *Manual of L.S. Mechatronics 2000*
[2] Bolton W., Mechatronics, *Pearson Publications,* 5/e, ISBN-13: 978-0273742869,2011

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…
CO1: Develop PLC program to control AC non servomotors, single acting and double acting pneumatic cylinders with different operation conditions
CO2: Develop PLC program to control various systems
CO3: Integrate various mechanical and electrical systems and operate them
CO4: Design and simulate the hydraulic and pneumatic circuits

Course Articulation Matrix (CAM):U18OE411C MECHATRONICS LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18OE411C.1	1	2	1	2	-	-	-	-	-	1	-	1	-	-	-
CO2	U18OE411C.2	1	2	1	2	2	-	-	-	-	1	-	1	1	1	1
CO3	U18OE411C.3	1	2	1	2	2	-	-	-	-	1	-	1	1	1	1
CO4	U18OE411C.4	1	2	1	2	2	-	-	-	-	1	-	1	1	1	1
U18OE411C		**1**	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**1**

U18OE411D WEB PROGRAMMING LABORATORY

Class: B.Tech. IV- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: implementing HTML Tags, CSS and JavaScript for creating static webpages
LO2: usage of JSP in designing dynamic web pages
LO3: usage of PHP in designing a web base application
LO4: accessing different web data servers using JSP and PHP

EXPERIMENT – 1

1. Design the following static web pages with the following attributes:
   a) Basic Tags.
   b) Heading Tags.
   c) List (Ordered and Un-Ordered).
   d) Textbox, Buttons.

EXPERIMENT – 2

1. HTML

AIM**:** Design the following static web pages required for an online book store web site.

a) HOMEPAGE:
b) LOGINPAGE
c) CATALOGUE PAGE

DESCRIPTION:

a. HOME PAGE

The static home page must contain three frames.

- *Top frame:* Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
- *Left frame:* At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.
- *Right frame:* The pages to the links in the left frame must be loaded here. Initially this page contains description of the website.

Logo	Website Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIV	*Description of website*			

b. LOGIN PAGE

Logo	Website Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL				
	Login			
	Password			
	SUBMIT		**RESET**	

EXPERIMENT – 3 (UNIT-1)

c. CATALOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- Snap shot of Cover Page.
- Author Name and Publisher.
- Price and Add to cart button.

Logo	Website Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIV		Book: Web Technologies Author: Kogent Publication: Dreamtech Press	$50	Add to Cart
		Book: JSP Complete Reference Author: Phil Hanna Publication: McGraw Hill	$28.5	Add to Cart
		Book: Web Technologies Author: Uttam K. Roy Publication: Oxford Higher Ed	$40	Add to Cart

EXPERIMENT – 4

1. VALIDATION

AIM: To do validation for registration page using JavaScript.

DESCRIPTION: Write JavaScript to validate the following fields of the above registration page.

a) Name (Name should contains alphabets and the length should not be less than 6 characters).
b) Password (Password should not be less than 6 characters length).
c) e-mailid (should not contain any invalid and must follow the standard pattern (*name@domain.com*)
d) Phone number (Phone number should contain 10 digit sonly).

Note: You can also validate the login page with these parameters.

2. CSS

AIM: Write a program illustrating various methods in cascading style sheets

a) Use different font, styles and set a background image
b) Control the repetition of the image
c) Define styles for links
d) Work with layers and add a customized cursor

DESCRIPTION: Design a web page using CSS (Cascading Style Sheets) which includes the following:

a) Use different font, styles: In the style definition you define how each selector should work (font, color etc.).Then, in the body of your pages, you refer to these selectors to activate the styles.
b) Set a background image for both the page and single elements on the page. You can define the background image for the page like this:
c) Control the repetition of the image with the background-repeat property. As background-repeat: repeat
d) Define styles for links
e) Work with layers:
f) Add a customized cursor:

```
Selector {cursor: value}
.xlink {cursor: crosshair}
.hlink {cursor: help}
```

3. Embedding JavaScript in HTML pages.
4. Design a registration form and validate its field by using JavaScript.

EXPERIMENT – 5

1. To design the scientific calculator and make event for each button using JavaScript
2. WAP to create popup boxes in Java Script
3. Program to create a class calculator that contains an overloaded method called "add" to calculate the sum of two integers, two float numbers and, one integer and one float

EXPERIMENT – 6

1. Print current date &time
2. JSP Program to auto refresh a page
3. JSP Program to count no. of visitors on website
4. JSP program for error handling
5. Demonstrate expression tag
6. Detect locale, language settings & local specific time
7. Demonstrate JSP implicit object
8. JSP Program to display given number in words

EXPERIMENT -7

1. Display the contents of Employee table in a neat format
2. Insert *N*, no. of records into Employee table using *PreparedStatement*
3. Enhance the salaries of Employee by 10% who are earning salary greater than 5000 using *CallableStatement*
4. Delete all students whose marks are below 50% and also display the count

EXPERIMENT - 8

1. Write a HTML file to create a simple form with 5 input fields ***(Name, Password, Email, Pin code, Phone No. and a Submit button)*** and demonstrate required field validations to validate that all input fields are required and display error messages if the above validations do not hold
2. Create a JSP Page with and run in JSP Engines
3. Demonstrate Session Tracking in JSP
4. JSP Program to validate username and password

EXPERIMENT - 9

1. Create Database Connectivity with JSP page with different JDBC Drivers
2. JSP Program to Select record from database
3. JSP Program to Insert a record into the database
4. Create a CRUD operation for JSP Page using MySQL
5. JSP Program to upload file into server

EXPERIMENT - 10

1. Create a form for your college library entering student details for each student in the college. Validate the form using PHP valuators and display error messages
2. Write a PHP which does the following job: Insert the details of the 3 or 4 users who register with the web site by using registration form, Authenticate the user when he submits the login form using the User Name and Password from the database (instead of cookies)

EXPERIMENT – 11

1. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP
2. Create and delete MYSQL database using PHP

EXPERIMENT – 12

1. Create a PHP program to demonstrate opening and closing a file
2. Create a PHP program to demonstrate reading a file and writing in a file

Laboratory Manual:

[1] *Web Programming Laboratory Manual,* Dept. of CSE (Networks), KITS Warangal.

Text Book:

[1] Kogent, *Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML*, 1st ed., New Delhi: Dreamtech Press (Black Book), 2013 *(Chapters 2, 3, 4, 5, 6, 7, 8, 12, 13)*

[2] Phil Hanna, *JSP: The Complete Reference*, 2nd ed., Noida: McGraw-Hill, 2001 *(Chapters 5, 6, 7, 8, 9, 10, 13, 14)*

Reference Books:

[1] Ivan Bayross, *Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP*, 4th ed., New Delhi: BPB Publications, 2009

[2] Uttam K. Roy, *Web Technologies*, 7th ed., New Delhi: Oxford Higher Education, 2010

[3] S Luke Welling, Laura Thomson, *PHP and MySQL Web Development*, 3rd ed., Chennai: Sams publications, 2005

[4] Jayson Falkner, Kevin Jones, *Servlets and Java Server Pages,* 1st ed., Chennai: Pearson, 2003

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: create the static web pages using HTML Tags and CSS and Java Scripts
CO2: design dynamic web page for web applications using JSP
CO3: develop server side scripts for web applications using PHP
CO4: design web applications for effective storage and retrieval of data in MySQL using PHP

Course Articulation Matrix (CAM):U18OE411D WEB PROGRAMMING LABORATORY																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE411D.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO2	U18OE411D.2	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO3	U18OE411D.3	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
CO4	U18OE411D.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE411D		2	2	2	1	2	1	1	1	2	1	2	1	2	2	2

U18OE411E MICROPROCESSORS LABORATORY

Class: B.Tech. IV- Semester
Branch: Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: programming using 8086 Microprocessor kit
LO2 basic arithmetic programs and sorting using 8086 Microprocessor kit
LO3: string manipulation and code conversions using MASM
LO4: interfacing of subsystems to 8086 microprocessor kit

LIST OF EXPERIMENTS

(Based on theory course U18OE303E)

1. Study of 8086 Trainer Board
2. Simple Arithmetic Operations (Addition, Subtraction, Multiplication and Division)
3. Finding Sum, Average.
4. Largest/Smallest Number in a given array
5. Arranging in Ascending/ Descending order
6. Finding Factorial using recursive procedure
7. Transfer of bytes from DS to ES
8. ALPs for String Manipulation
9. ALPs for Code conversions
10. Wave form Generation using DAC modules
    i. Square wave ii. Sawtooth wave iii. Triangular wave
11. ADC interfacing
12. Stepper motor –interfacing

Laboratory Manual:

[1] *Microprocessors Laboratory Manual*, prepared by the faculty of department of ECE, KITSW

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: write and execute assembly language programs for given tasks on 8086 microprocessor kit
CO2: implement code conversions and bit manipulations programs in 8086 using MASM
CO3: write waveform generation code using DAC modules
CO4: interface stepper motor, keyboard, memory etc. with 8086 microprocessor

Course Articulation Matrix (CAM):U18OE411E MICROPROCESSORS LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18OE411E.1	3	3	2	1	-	-	-	-	-	-	-	-	2	2	1
CO2	U18OE411E.2	3	2	2	1	-	-	-	-	-	-	-	-	2	2	1
CO3	U18OE411E.3	3	2	1	1	-	-	-	-	-	-	-	-	2	2	1
CO4	U18OE411E.4	3	3	2	1	-	-	-	-	-	-	-	-	2	2	1
U18OE411E		3	2.5	1.75	1	-	-	-	-	-	-	-	-	2	2	1

U18OE411F STRENGTH OF MATERIALS LABORATORY

Class: B.Tech. IV- Semester
Teaching Scheme:

L	T	P	C
-	-	2	1

Branch: Common to all branches
Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: testing of civil engineering materials
LO2 mechanical properties of civil engineering materials
LO3: behavior of civil engineering materials when tested
LO4: :codes specifications of various engineering materials

LIST OF EXPERIMENTS

1. Determination of Stress–Strain characteristics of (a) Mild steel and (b) TOR steel.
2. Determination of the compressive strength of wood and punching shear strength.
3. Determination of the brinell's hardness numbers for steel, brass and aluminum.
4. Determination of the modulus of rigidity by conducting torsion test on solid shaft or hollow shaft.
5. Determination of the modulus of rigidity by conducting compression test on spring.
6. Determination of the Young's modulus of the given material by conducting flexural test on simply supported beam.
7. Determination of the Young's modulus of the given material by conducting flexural test on continuous beam.
8. Determination of the Young's modulus of the given material by measuring conducting flexural test on propped cantilever beam.
9. Bend and re bend test on steel specimen.
10. Shear test for Mild steel specimen.
11. Impact test on Metal Specimens using Izod test.
12. Impact test on Metal Specimens using Charpy test.
13. Demonstration of measuring strains using strain gauges, LVDTs

Laboratory Manual:

[1] *Strength of Materials Laboratory Manual*, prepared by faculty of Civil Engineering, KITSW

Reference Book:

[1] Harmer E. Davisand George Earl roxell, *Testing and Inspection of Engineering Materials*, Mc Graw-Hill book company, inc,2ndedn.,1955

[2] A.V.K. Suryanarayana, *Testing of Metallic Materials*, Prentice-Hall of India, 2ndedn.,2007

[3] IS 1786:2008, *High strength deformed steel bars and wires for concrete reinforcement- specification,* Bureau of Indian standards, New Delhi,2008

[4] IS 432(Part-I):1982, *Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement*. Bureau of Indian standards, New Delhi, 1992

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: correlate theory with the testing of engineering materials for quality assessment
CO2: evaluate the mechanical properties of civil engineering materials
CO3: appraise the behavior of civil engineering materials when tested under loads
CO4: realize the specifications recommended by codes to civil engineering materials

Course Articulation Matrix (CAM):U18OE411F STREANGTH OF MATERIALS LABORATORY																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE411F.1	1	-	-	1	-	1	-	-	2	1	1	1	1	1	1
CO2	U18OE411F.2	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1
CO3	U18OE411F.3	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1
CO4	U18OE411F.4	1	-	-	1	-	1	-	2	1	1	1	1	1	1	1
U18OE411F		**1**	**-**	**-**	**1**	**-**	**1**	**-**	**2**	**1.75**	**1**	**1**	**1**	**1**	**1**	**1**

U18CH416 ENVIRONMENTAL STUDIES

Class: B.Tech. IV- Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
2	-	-	2

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: necessity to use natural resources more equitably
LO2: concepts of ecosystem and the importance of biodiversity conservation
LO3: causes, effects and control measures of various environmental issues
LO4: : issues involved in enforcement of environmental legislation

UNIT – I (6)

Introduction - The multidisciplinary nature of environmental studies - definition, scope and importance. Natural Resources: Forest Resources - Use and over–exploitation of forests, deforestation, timber extraction, mining, dams - their effects on forests and tribal people; Water Resources - Use and over- utilization of surface and ground water, floods, drought, conflicts over water; Mineral Resources - Environmental effects of extracting and using mineral resources; Agricultural Land - Land as a resource, land degradation, soil erosion and desertification; Food Resources - World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging and salinity; Energy Resources - Renewable and non-renewable energy sources, use of alternate energy sources

UNIT - II (6)

Ecosystem and Biodiversity: Ecosystem - Concepts of an ecosystem, food chain, food webs, ecological pyramids, energy flow in the ecosystem and ecological succession

Biodiversity and its Conservation – Introduction, definition, genetic, species and ecosystem diversity, value of biodiversity, biodiversity in India, hot spots of biodiversity, man-wildlife conflicts, endangered and endemic species of India, in-situ and ex-situ conservation

UNIT - III (6)

Environmental Pollution: Global climatic change, green house gases, effects of global warming, ozone layer depletion; International conventions/protocols - Earth summit, Kyoto protocol and Montreal protocol; causes and effects of air, water, soil, marine and noise pollution with case studies; solid and hazardous waste management, effects of urban industrial and nuclear waste; natural disaster management - flood, earthquake, cyclone and landslides

UNIT - IV (6)

Social Issues and the Environment: Role of Individual and Society - Role of individual in prevention of pollution, water conservation, Rain water harvesting and watershed management; Environmental Protection / Control Acts - Air (Prevention and control of Pollution) Act- 1981, water (Prevention and Control of Pollution) Act-1974, water Pollution Cess Act-1977, Forest conservation Act (1980 and 1992), wildlife Protection Act 1972 and environment protection Act 1986, issues involved in enforcement of environmental legislations; Human Population and Environment - Population growth, family welfare programmes, women and child welfare programmes, role of information technology in environment and human health

Text Book:

[1] Erach Bharucha, "Text Book *of Environmental Studies for Under Graduate Courses" (*2nd ed.) Universities Press (India) Private Limited, 2013

Reference Books:

[1] Y. Anjaneyulu, *Introduction to Environmental Science*, B.S. Publications, 2004
[2] Gilbert M. Masters, *Introduction to Environmental Engineering & Science*, Prentice Hall of India, Third Edition,1991
[3] Anubha Kaushik, C.P. Kaushik, *Environmental Studies*, 4/e, New Age International Publishers,2014
[4] R.Rajagopalan, *Environmental Studies from crisis to cure*, Oxford University Press, Second Edition,2011

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: investigate any environmental issue using an interdisciplinary framework
CO2: formulate an action plan for sustainable alternatives and conserving biodiversity that integrates science, humanist, social and economic perspective
CO3: identify and explain the complexity of issues and processes which contribute to an environmental problem
CO4: participate effectively in analysis and problem-solving through knowledge in environmental legislations

Course Articulation Matrix (CAM): U18CH416 ENVIRONMENTAL STUDIES																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CH416.1	2	1	2	1	-	2	1	-	1	-	-	-	2	1	2
CO2	U18CH416.2	-	-	2	-	-	1	2	-	1	-	-	-	-	-	2
CO3	U18CH416.3	1	2	1	-	-	1	2	1	1	-	-	-	1	2	1
CO4	U18CH416.4	-	-	1	-	-	1	2	-	1	-	-	-	-	-	1
U18CH416		**1.5**	**1.5**	**1.5**	**1**	**-**	**1.25**	**1.75**	**1**	**1**	**-**	**-**	**-**	**1.5**	**1.5**	**1.5**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
V-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[6Th+3P+Seminar]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18TP501	Quantitative Aptitude & Logical Reasoning	2	-	-	1	10	30	40	60	100
2	PE	U18CN502	Professional Elective - I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18CN503R22	Advanced Computer Networks	3	1	-	4	10	30	40	60	100
4	PCC	U18CN504R22	Internet of Things	3	-	-	3	10	30	40	60	100
5	PCC	U18CN505	Compiler Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CN506R22	Machine Learning	3	-	-	3	10	30	40	60	100
7	PCC	U18CN507R22	Advanced Computer Networks Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN508R22	Internet of Things Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN509	Machine Learning with Python Programming Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CN510	Seminar	-	-	2	1	100	-	100	-	100
Total:				17	1	8	21	280	180	460	540	1000
***Additional Learning*:** *Maximum credits allowed for Honours / Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for students opted for Honours/Minor:				-	-	-	*21+7*	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] Total Contact Periods/Week : 26 Total Credits : 21

Professional Elective-I / MOOC-I:
U18CN502A: Artificial Intelligence
U18CN502B: Data Mining & Data Warehousing
U18CN502C: Digital Image Processing
U18CN502M: MOOCs course

U18TP501 QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B.Tech. V- Semester

Branch: Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: quantitative aptitude & problem solving skills

LO2: computing abstract quantitative information

LO3: application of basic mathematics skills & critical thinking to draw conclusions

LO4: evaluating the validity & possible biases in arguments presented in authentic contexts

UNIT-I (6)

Quantitative Aptitude-I: Number system, Averages, Percentages, Ratios & proportions, Time, Speed &distance, Time and work, Data interpretation

UNIT-II (6)

Quantitative Aptitude-II: Simple Interest, Compound Interest, Profit & loss, Ages, Permutations &Combinations, Probability

UNIT-III (6)

Logical Reasoning-I: Series completion, Analogy, Coding and decoding, Blood relations, Number, Ranking & Time sequence test, Linear & Circular arrangements

UNIT-IV (6)

Logical Reasoning-II: Data sufficiency, Logical Venn diagram, Syllogisms, Statement & Arguments, Statement & Assumptions, Direction sense test

Text Books:

[1] RS Agarwal, Quantitative Aptitude for Competitive Examinations ,3rd ed. NewDelhi: S.Chand Publications, 2019. (Chapters1,6,7,8,10,11,12,15,17,21,22,30,31)

[2] RS Agarwal, A Modern Approach to Verbal and Non-Verbal Reasoning, 3rd ed. NewDelhi: S.Chand Publications, 2019. (Chapters Section I: 1, 3, 4, 5, 6, 8, 16, Section II: 2, 3)

Reference Books:

[1] Dinesh Khattar, *Quantitative Aptitude for Competitive Examinations*, NewDelhi: Pearson India, 2019.

[2] Nishit K Sinha, *Reasoning for Competitive Examinations*, New Delhi: Pearson India, 2019.

[3] R.N.Thakur, *General Intelligence and Reasoning*, NewDelhi: McGraw Hill Education, 2017.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Webpage.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: solve arithmetic relationships and interpret data using mathematical models
CO2: compute abstract quantitative information
CO3: apply basic mathematics & critical thinking skills to draw conclusions and solve problems
CO4: evaluate the validity & possible biases in arguments presented in authentic contexts logically &sensibly

Course Articulation Matrix (CAM):U18TP501 QUANTITATIVE APTITUDE AND LOGICAL REASONING																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18TP501.1	-	2	-	1	-	-	-	-	-	-	-	1	-	-	1
CO2	U18TP501.2	-	2	-	1	-	-	-	-	-	-	-	1	-	-	1
CO3	U18TP501.3	-	1	-	2	-	2	-	-	-	-	-	1	-	-	1
CO4	U18TP501.4	-	1	-	2	-	2	-	-	-	-	-	1	-	-	1
U18TP501		-	1.5	-	1.5	-	2	-	-	-	-	-	1	-	-	1

U18CN502A ARTIFICIAL INTELLIGENCE

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: fundamentals of Artificial Intelligence, agents, problem solving approaches & searching techniques

LO2: local search algorithms, game playing, solution searching using min-max and CSP problems

LO3: prepositional logic syntax & semantics, inference procedure, first order logic and NLP concepts

LO4: decision theory, making simple & complex decisions and robot hardware, software motion and applications

UNIT-I (9)

Introduction: Introduction to AI, The foundations & history of AI

Intelligent Agents: Agents and environments, Nature of environments, Structure of agents

Problem Solving: Problem-solving agents, Example problems searching for solutions, Uninformed and informed search strategies, Heuristic functions

UNIT - II (9)

Classical Search: Local search algorithms & optimization problems, Local search in continuous space, searching in nondeterministic actions, Partial observations

Adversarial Search: Game playing, The Mini-max search procedure, Alpha-Beta pruning, cutoffs and Additional refinements

Constraint Satisfaction Problems (CSP): Constraint propagation, Backtracking search for CSPs

UNIT - III (9)

Logical Agents: Knowledge based agents, Wumpus world, Propositional logic

First Order Logic (FOL): Syntax & Semantics, Using FOL, Knowledge engineering, Inference in FOL, Forward chaining, Backward chaining, Resolution

Natural Language for Communication: Phrase structure grammars, Syntactic analysis, Augmented grammars, Machine translation

UNIT - IV (9)

Quantifying Uncertainty: Acting under uncertainty, Bayes' rule

Probabilistic Reasoning Over Time: Time and uncertainty, Inference in temporal models, Hidden Markov models, Kalman filters, Dynamic Bayesian networks

Making Simple and Complex Decisions: Combining beliefs and desires under uncertainty, The basis of utility theory, Utility functions, Sequential decision problems, Value iteration and Policy iteration

Robotics: Robotic hardware, Perception, Planning and control, Application domains

Text Books:

[1] Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed., New Delhi: Prentice Hall Series in AI, 2010. (*Chapters 1-7, 9, 11, 14, 15, 16, 17, 25*)

Reference Books:

[1] Elaine rich and Kevin knight, *Artificial Intelligence*, 2nd ed., New Delhi: Tata McGraw-Hill, 2002.

[2] Mark Stefik, *Introduction to Knowledge Systems*, San Francisco: Morgan Kaufman, 1995

[3] Winston, Patrick Henry, *Artificial Intelligence*, 3rd ed., California: Addison Wesley, 1995

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Webpage.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: apply fundamentals of artificial intelligence for various engineering problem-solving approaches

CO2: analyze search algorithms, game playing and constraint satisfying problem & solutions for designing effective artificial intelligence solutions

CO3: develop effective decision making artificial intelligent systems using prepositional logic, fist order logic and NLP concepts

CO4: apply decision theory for simple & complex problems and illustrate the software & hardware used in robotics

Course Articulation Matrix (CAM):U18CN502A ARTIFICIAL INTELLIGENCE																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18TP502A.1**	2	2	2	2	1	1	-	1	1	1	-	2	3	1	1
CO2	**U18TP502A.2**	3	3	3	2	1	1	-	1	1	1	-	2	3	1	1
CO3	**U18TP502A.3**	3	3	3	2	1	1	-	1	1	1	-	2	3	1	1
CO4	**U18TP502A.4**	3	2	3	2	1	1	-	1	1	1	-	2	3	1	1
U18TP502A		2.75	2.5	2.75	2	1	1	-	1	1	1	-	2	3	1	1

U18CN502B DATA WAREHOUSING AND DATA MINING

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: data warehouse architecture, multidimensional modeling & preprocessing

LO2: algorithms for mining frequent patterns &associations rules

LO3: classification models and relevant evaluation techniques

LO4: : clustering techniques and data mining applications on web, finance & retail business

UNIT-I (9)

Data Warehouse: Basic concepts, Multitier architecture, Data warehouse models, ETL tools, Metadata repository

Multidimensional Data Modeling: Data cube, Star, Snowflake and Fact constellation schemas, Dimensions, Measures, OLAP operations, Star net query model

Data Warehouse Implementation: Efficient data cube computation, Indexing OLAP, Efficient processing of OLAP queries, OLAP servers

Data Preprocessing: Data cleaning, Integration, Reduction and Transformation

UNIT - II (9)

Data Mining: Introduction, Types of data and patterns can be mined, Technologies Used, Applications Targeted, Major issues in data mining

Association Rule Mining: Basic concepts, Apriori algorithm, Generating association rules from frequent item sets, Improvements of Apriori algorithm, Patten-Growth approach, Mining frequent Item sets using vertical data format, Mining closed frequent item sets, Correlation analysis, Patten mining in multilevel and multidimensional space, Constraint based frequent pattern mining

UNIT - III (9)

Classification: Basic Concepts, Classification by decision tree induction, Bayesian classification, Rule based classification, Model evaluation and Selection

Advanced Classification: Classification by back propagation, Associative classification, K Nearest Neighbor classifiers, Rough set and Fuzzy set approaches

UNIT - IV (9)

Cluster Analysis: Introduction, Types of data in cluster analysis, Partitioning methods by K-Means and K-Medoids, Agglomerative versus Divisive hierarchical clustering, BIRCH Multiphase hierarchical clustering, Density based method with DBSCAN algorithm, Grid based method with STING, Evaluation of clusters, Outlier Analysis and detection methods

Data Mining Trends: Mining sequence data, Web data mining, Data mining applications with Finance data analysis, Retail industry and Recommender systems

Text Books:

[1] Jiawei Han, Micheline Kamber, *Data Mining Concepts and Techniques*, 3rd ed., Singapore: Morgan Kaufmann Publishers, 2016

Reference Books:

[1] Sam Anahory, Dennis Murray, *Data warehousing in the real world*, New Delhi: Pearson Education, 2003

[2] C.S.R.Prabhu, *Data Warehousing Concepts, Techniques, Products and Applications*, 2nded. New Delhi: Prentice-Hall of India, 2002

[3] Arun K. Pujari, *Data Mining Techniques*, 2nd ed. Hyderabad: Universities press, 2010

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Webpage.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design multi dimensional models & preprocessing strategies for data warehouses applications
CO2: apply frequent pattern mining techniques on data sets for association rules extraction
CO3: analyze efficiency of classification algorithms
CO4: evaluate clustering techniques and design data mining applications on web & financial domains

Course Articulation Matrix (CAM):U18CN502B DATA WAREHOUSING AND DATA MINING																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18TP502B.1	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO2	U18TP502B.2	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO3	U18TP502B.3	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO4	U18TP502B.4	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
U18TP502B		2	2	2	2	2	-	-	1	1	1	-	2	2	-	-

U18CN502C DIGITAL IMAGE PROCESSING

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: fundamental concepts of digital image processing such as sampling, quantization, and basic relationship between pixels

LO2: intensity transformation functions, spatial domain filters, and frequency domain filters for smoothing and sharpening of input images

LO3: morphological image processing and image segmentation techniques applied on input images to filter and segment the objects present in input image

LO4: extracting features from an object present in an input image and identify the object using classification techniques

UNIT-I (9)

Introduction: What is digital image processing, Origins of digital image processing, Examples of fields that use digital image processing, Fundamental steps in digital image processing, Components of an image processing system

Digital Image Fundamentals: Elements of visual perception, Light and the electromagnetic spectrum, Image sensing and acquisition, Image sampling and quantization, some basic relationships between pixels, Introduction to the mathematical tools used in digital image processing

UNIT - II (9)

Intensity Transformations & Spatial Filtering: The basics of intensity transformations and spatial filtering, Basic intensity transformation functions, Histogram processing, Fundamentals of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Combining spatial enhancement methods

Filtering in the Frequency Domain: A brief history of the Fourier series and transform, Preliminary concepts, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, Some properties of the 2-D discrete Fourier transform, The basics of filtering in the frequency domain

UNIT - III (9)

Morphological Image Processing: Preliminaries, Erosion and dilation, Opening and closing, Hit-or-miss transformation, Some basic morphological algorithms

Image Segmentation-I Edge Detection, Thresholding, and Region Detection: Fundamentals, Point, Line and edge detection, Thresholding, Segmentation by region growing and by region splitting and merging, Region segmentation using clustering and super pixels, Segmentation using morphological watersheds

UNIT - IV (9)

Feature Extraction: Background, Boundary preprocessing, Boundary feature descriptors, Region feature descriptors, Principal components as feature descriptors, Whole-image features, Scale-invariant feature transform

Image Pattern Classification: Background, Patterns and pattern classes, Pattern classification by prototype matching, Optimum (Bayes) statistical classifiers, Neural networks and deep learning, Deep convolution neural networks

Text Books:

[1] Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing*, 4th ed., New Delhi: Pearson, 2018 *(Chapters 1 to 4, 9 to 12)*

Reference Books:

[1] Anil K. Jain, *Fundamentals of Image Processing*, 1st ed., Chennai: Pearson, 2015

[2] B. Chanda, D. Dutta Majunder, *Digital Image Processing and Analysis*, 2nd ed., New Delhi: Prentice Hall of India, 2011

[3] S. Sridhar, *Digital Image Processing*, 2nd ed., Noida: Oxford University Press, 2016

[4] Munesh C. Trivedi, *Digital Image Processing*, 1st ed., New Delhi: Khanna Book Publishing, 2014

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: make use of the concepts of digital image processing such as sampling, quantization, and basic relationships between pixels during pre-processing stage of image processing

CO2: identify the effect of intensity transformation functions, frequency and spatial domain filters on input images for image smoothing and sharpening

CO3: apply morphological image processing techniques on objects present in input images to extract image components and discover novel ways to segment the objects present in the input images

CO4: discover novel ways to extract the features to depict the shape of an object and apply classification techniques to identify the object present in an input image

Course Articulation Matrix (CAM):U18CN502C DIGITAL IMAGE PROCESSING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18TP502C.1**	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO2	**U18TP502C.2**	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO3	**U18TP502C.3**	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	**U18TP502C.4**	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18TP502C		2.75	2.75	2.75	2.75	1	-	-	1	1	1	-	2.5	1	1	1

U18CN503R22 ADVANCED COMPUTER NETWORKS

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: internetworking and internet addressing
LO2: mapping of internet address to physical address and working of internet protocol
LO3: routing architecture, routing among the autonomous and within the autonomous systems
LO4: network virtualization and network management

UNIT-I (9)

Introduction And Overview: The motivation for internetworking, The TCP/IP internet, internet services, History and scope, IAB, RFC, Internet growth, New version of IP, IPv4 and IPv6 relationship, IPv6 migration, Dual stack systems

Internetworking Concept And Architectural Model: Introduction, Application-level interconnection, Network-level interconnection, Properties of internet, Internet architecture, Interconnection of multiple networks with IP routers, The user's view

Internet Addressing: Universal host identifiers, **IPv4:** Classfull addressing scheme, Dotted decimal notation used with IPv4, IPv4 Subnet addressing, Fixed length subnets, Variable length subnets, Implementation of IPv4 subnets with masks, Subnet mask representation and slash notation, classless addressing scheme, address blocks and CIDR slash notation, CIDR blocks reserved for private networks, **IPv6:** Addressing scheme, Colon hexadecimal notation, Address space assignment, Embedding IPv4 address in IPv6 for transition, Unicast address and /64, Interface identifiers and MAC addresses, Special addresses in IPv4 and IPv6, Internet address assignment and delegation of authority

UNIT - II (9)

Mapping Internet Address to Physical Address: Introduction, Address resolution problem, Types of hardware addresses, Resolution through direct mapping, IPv4 address translation through dynamic binding, ARP: Cache, Refinements, Implementation, Encapsulation and identification, Message format, Automatic cache revalidation. Reverse address resolution (RARP), Proxy ARP

Internet Protocol Connectionless Datagram Delivery: Purpose and importance, The IP datagram, Datagram: Type of service and differentiated services, Encapsulation, Size, Network MTU, Fragmentation, Reassembly, Header fields, Time to live, Hop limit

Internet Protocol Error And Control Messages (ICMP): Introduction, ICMP, Message delivery, Conceptual layering, Message format, ICMP message types used with IPv4 & IPv6, Testing destination reachability and status, Echo request and reply message format, Checksum computation and pseudo header, Reports of unreachable destinations, Error reports regarding fragmentation, Route change request from routers

UNIT - III (9)

Routing Architecture: Introduction, Origin of forwarding tables, Forwarding with partial information, Original internet architecture and cores, Peer backbones, Automatic route propagation and a FIB, Distance-Vector(Bellman-Ford) routing, Link state (SPF) Routing

Routing Among Autonomous Systems: Introduction, Scope of route update protocol, Practical limit on group size, Autonomous system concept, Exterior gateway protocols and reachability, BGP: Characteristics, Functionality and message types, Message header, OPEN message, UPDATE message

Routing Within an Autonomous System: Introduction, Static Vs Dynamic routes, Routing information Protocol (RIP), Slow convergence problem, RIP message format, Fields in a RIP message, RIP for IPv6 (RIPng), OSPF: OSPFv2 Message formats. OSPFv3 to support IPv6, IS-IS route propagation protocol

UNIT - IV (9)

Network Virtualization: Virtualization, VPN, VPN Tunneling and IP-in-IP Encapsulation, VPN Addressing and Forwarding, Extending VPN to individual hosts, Network address translation (NAT): Overview, Translation table creation, Variant of NAT, Interaction between NAT and ICMP, Interaction between NAT and Applications, Versions of NAT in different OS

Network Management: Introduction, The level of management protocols, Architectural model, Protocol framework, Examples of MIB variables, Structure of management information, Structure and representation of MIB object names, MIB changes and additions for IPv6, Simple network management protocol(SNMP), SNMP Message format, An example encoded SNMP message, Security in SNMPv3

Text Books:

[1] Douglas.E.Comer, *Internetworking with TCP/IP Vol I: Principles, Protocols, and Architecture*, 6thed., USA: Pearson Education, 2014. *(Chapters: 1,3,5,6,7,9,12,13,14,19,27)*

Reference Books:

[1] James F. Kurose, Keith W. Ross, *Computer networking, A Top Down approach*, 6th ed., United States of America: Pearson Education, 2013

[2] Shah, Ambawade, Mehra, Agarwal, *Advanced Computer Networks*, revised ed., New Delhi, Dreamtech, *Press, 2011*

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design subnets in LAN using CIDR,VLSM
CO2: Identify the functions of internet protocol and ICMP
CO3: develop network routing architecture with routing algorithms
CO4: design of a VPN, NAT and use of network management protocols in managing the networks

Course Articulation Matrix (CAM):U18CN503R22 ADVANCED COMPUTER NETWORKS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18TP503R22.1**	2	2	2	1	-	-	-	1	1	1	-	2	2	2	1
CO2	**U18TP503R22.2**	2	2	2	2	-	-	-	1	1	1	-	2	2	2	1
CO3	**U18TP503R22.3**	2	2	3	3	-	-	-	1	1	1	-	2	2	3	2
CO4	**U18TP503R22.4**	2	3	2	3	-	-	-	1	1	1	-	2	2	3	2
U18TP503R22		2	2.25	2.25	2.2	-	-	-	1	1	1	-	2	2	2.5	1.5

U18CN504R22 INTERNET OF THINGS

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…
LO1: fundamentals, Physical & logical designs of Internet of Things
LO2: standard architectures & protocols of Internet of Things
LO3: components and IP addressing optimizations of Internet of Things
LO4: internet of Things platforms, security issues and application areas

UNIT-I (9)

Introduction: What is the Internet of Things (IoT), IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities.

Physical and Logical Design of IoT: Things of IoT, IoT Protocols, Functional block, communication Model, Communication API's

IoT Enabling Technologies: WSN, cloud computing, Big data Analytics, communication Protocols, Embedded systems, IoT levels and Deployment templates

UNIT - II (9)

IoT Network Architecture: The M2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture

IoT Protocol Stack: The Core IoT Functional Stack, Sensors and Actuators Layer, Communications Network Layer, Applications and Analytics Layer, IoT Data Management and Compute Stack, Fog Computing, Edge Computing, the Hierarchy of Edge, Fog and Cloud

IoT and M2M: Introduction to M2M, Difference between IoT and M2M, software defined networking and Network function virtualization

UNIT - III (9)

Smart Objects: Sensors, Actuators, Smart Objects and Sensor Networks

Connecting Smart Objects: Communications Criteria, IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and 802.15.4e, IEEE 1901.2a, IEEE 802.11ah, LoRaWAN

Optimizing IP for IoT: The Need for Optimization, From 6LoWPAN to 6Lo, Header Compression, Fragmentation, Mesh Addressing, Mesh-Under Versus Mesh-Over Routing, 6Lo Working Group, 6TiSCH, RPL, Authentication and Encryption on Constrained Nodes, Profiles and Compliances

UNIT - IV (9)

IoT Platforms: Raspberry Pi, Raspberry Pi Interfaces, Other IoT Devices: pcDuino, Beagle Bone Black, Cubie Board, ARDUINO

Securing IoT: How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures, The Phased Application of Security in an Operational Environment

IoT Physical Servers and Cloud Offerings: Introduction to cloud storage models and communication API's, WAMP- for IoT, Python web application framework, Designing a RESTful web API.AutoBahn

IoT case studies: Home Automation, Smart and connected Cities, Transportation, Public safety, Environment and Agriculture

Text Books:

[1] Arshdeep Bahga and Vijay Madisetti, *Internet of Things: A Hands-On Approach,* Hyderabad: University Press, 2015

[2] David Hanes, Gonzalo Salgueiro and Patrick Grossetete, *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things,* Cisco Press, 2017. (Chapters: 2, 3, 4, 5, 8, 13, 15)

Reference Books:

[1] Bassi Alessandro, *Enabling things to talk*, Berlin: Springer-Verlag, 2016

[2] Hersent, Olivier, David Boswarthick, and Omar Elloumi, *The internet of things: Key applications and protocols*. London: John Wiley & Sons, 2011

[3] Buyya, Rajkumar, and Amir Vahid Dastjerdi, *Internet of Things: Principles and paradigms*. New York: Elsevier, 2016

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: demonstrate fundamentals, Physical & logical designs of Internet of Things

CO2: analyze standard architectures & protocols of Internet of Things

CO3: select effective components and IP addressing structure to develop IoT applications

CO4: design IoT applications for domestic safety, transportation and agricultural applications

Course Articulation Matrix (CAM):U18CN504R22 INTERNET OF THINGS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18TP504R22.1	1	2	2	2	1	-	-	-	1	1	1	1	2	2	2
CO2	U18TP504R22.2	1	2	2	2	-	-	-	-	1	1	-	1	2	2	2
CO3	U18TP504R22.3	1	2	2	2	1	-	-	-	1	1	-	1	2	2	2
CO4	U18TP504R22.4	1	2	2	2	-	-	-	-	1	1	1	1	2	2	2
U18TP504R22		1	2	2	2	1	-	-	-	1	1	1	1	2	2	2

U18CN505 COMPILER DESIGN

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: phases of a compiler and design of a lexical analyzer
LO2: parsing techniques using context-free grammar and construction of syntax tree
LO3: specification of a type checker, storage allocation strategies and generating intermediate form for the given programming statements
LO4: generating target code from the intermediate form and applying code optimization techniques to improve the performance of the code

UNIT-I (9)

Introduction to Compiling: Compilers, Analysis of the source program, Phases of a compiler, Cousins of the compiler, Grouping of phases, Compiler construction tools
Lexical Analysis: Role of lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language for specifying lexical analyzers, Finite automata, Design of a lexical analyzer, Optimization of deterministic finite automata based pattern matchers

UNIT-II (9)

Syntax Analysis: Role of the parser, Writing grammars, Context free grammars, Top down parsing, Bottom up parsing, Operator precedence parsing, LR parsers, Using ambiguity grammars, Parser generators
Syntax Directed Translation: Syntax directed definitions, Construction of syntax trees, Bottom up evaluation of S-attributed definitions, L-attributed definitions, Top down translation, Bottom up evaluation of inherited attribute, Space for attribute values at compile time, Analysis of syntax directed definition

UNIT-III (9)

Type Checking: Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions
Runtime Environments: Source language issues, Storage organization, Storage allocation strategies, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques
Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Back patching

UNIT-IV (9)

Code Generation: Issues in the design of code generator, The target machine, Runtime storage management, Basic blocks and flow graphs, Next-use information, A simple code generator, Register allocation and assignment, Directed acyclic graph representation of basic blocks, Peephole optimization, Generating code from directed acyclic graphs, Code generation algorithm. Code Optimization: Introduction, The principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data flow analysis, Code improving transformations

Text Book:

[1] Alfred V.Aho, Ravi Sethi and Jeffrey D.Ullman, *Compilers: Principles, Techniques and Tools*, 2nd ed. Hong Kong: Pearson Education Asia, 2013.

Reference Books:

[1] Allen I. Holub, *Compiler Design in C*, 2nd ed. New Jersey: Prentice Hall of India, 2003.
[2] C. N. Fischer, R. J. LeBlanc, *Crafting a compiler with C*, California: Pearson Education, 2003.
[3] J.P. Bennet, *Introduction to Compiling Techniques*, 2nd ed. New York: McGraw-Hill, 2003.
[4] Henk Alblas, Albert Nymeyer, *Practice and Principles of Compiler Building with C*, London: PHI, 2001.

Course Research Papers: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design lexical analyzer using regular expressions to generate tokens from the given programming statements
CO2: construct syntax tree and parsing table for the given context-free grammar
CO3: generate intermediate code for the given programming statements
CO4: write target code from the intermediate form and apply code optimization techniques to improve the performance of the code

Course Articulation Matrix (CAM):U18CN505 COMPILER DESIGN

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN505.1	3	3	2	2	1	-	-	1	1	1	-	2	1	1	1
CO2	U18CN505.2	3	3	2	2	1	-	-	1	1	1	-	2	1	1	1
CO3	U18CN505.3	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	U18CN505.4	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18CN505		3	3	2.5	2.5	1	-	-	1	1	1	-	2.5	1	1	1

U18CN506R22 MACHINE LEARNING

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: machine learning fundamentals, binary classification and handling more than two classes
LO2: dimensionality reduction, linear and kernel models
LO3: fundamentals of ANN, multi-layer feed forward and back propagation networks
LO4: reinforcement learning, decision making by ensemble learning

UNIT – I (9)

The ingredients of machine learning: The problems that can be solved with machine learning, The output of machine, The workhorses of machine
Binary classification: Classification, Scoring and Ranking, Class probability estimation
Beyond Binary Classification: Handling more than two classes
Case Study: Spam filtering

UNIT - II (9)

Dimensionality Reduction: Linear discriminant analysis (LDA), Principal components analysis (PCA), Factor analysis, Independent components analysis (ICA)
Linear Models: The Least-Squares method, Multivariate linear regression
Support Vector Machines: Optimal separation, Kernels, The support vector machine algorithm, Extensions to the SVM
Case Study: Disease prediction using SVM

UNIT - III (9)

Artificial Neural Networks: Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptron, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm
The Multi-layer Perceptron: Going forwards, Going backwards, Back-propagation of error, The Multi-layer perceptron in practice, Examples of using the MLP, A Recipe for using the MLP, Deriving Back-Propagation

UNIT - IV (9)

Reinforcement Learning: Overview, Example: getting lost, Markov decision processes, Values, Back on holiday: Using reinforcement learning, The difference between SARSA and Q-Learning, Uses of Reinforcement learning
Ensemble Learning: Boosting, Bagging, Random forests, Different ways to combine classifiers
Case Study: optimization of disease prediction using ensemble learning

Text Books:

[1] Peter Flach, *Machine Learning: The Art and Science of Algorithms that Make Sense of Data*, Cambridge University Press, 1st ed., ISBN: 978-1 -107-09639-4, 2012.
[2] Stephen Marsland, Taylor & Francis, *Machine Learning: An Algorithmic Perspective*, CRC, ISBN -13: 978-1420067187, 2009:

Reference Books:

[1] Tom M. Mitchell, *Machine Learning*, MGH, Indian Edition, ISBN 1259096955, 2013
[2] S. Russell and P. Norvig, *Artificial Intelligence – A Modern Approach*, 2nd ed., Pearson Education, 2003, ISBN: 978-0137903955
[3] Jason Bell, *Machine Learning: Hands-On for Developers and Technical Professionals*, John Wiley & Sons, 1st ed., ISBN-13: 978-1118889060, 2014.
[4]William W Hsieh, *Machine Learning Methods in the Environmental Sciences, Neural Networks*, Cambridge University Press, ISBN -13: 978-0805822410, 2009.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students' will be able to…
CO1: classify given input class based on binary and multivariate classification techniques
CO2: apply linear models and dimensionality reduction in real world problems like disease prediction
CO3: analyze the ANN and its usage in real world problems like handwritten digit recognition
CO4: analyze the concepts of reinforcement learning and decision making by ensemble learning

Course Articulation Matrix (CAM):U18CN506R22 MACHINE LEARNING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN506R22.1	2	2	3	2	2	-	-	1	1	2	-	2	2	1	2
CO2	U18CN506R22.2	3	3	3	2	2	-	-	1	1	2	-	2	2	1	3
CO3	U18CN506R22.3	3	3	3	3	3	-	-	1	1	2	-	2	2	1	3
CO4	U18CN506R22.4	2	2	3	3	3	-	-	1	1	2	-	2	2	1	2
U18CN506R22		2.5	2.5	3	2.5	2.5	-	-	1	1	2	-	2	2	1	2.5

U18CN507R22 ADVANCED COMPUTER NETWORKS LABORATORY

Class: B.Tech. IV- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: *basic network commands, identifying network devices, install and configuring network simulation tool*

LO2: *PDU, ARP, ICMP analysis in a network with Packet Tracer*

LO3: *network configuration with static route, DVRP RIP and OSPF link state routing protocol*

LO4: *VPN, NAT configuration in a network, SNMP messages in network management*

List of Experiments

Experiment-I

1)

a. Identifying different networking devices Hub, Switch, Router
b. Configure IPv6 address on a computer (IP, Subnet, Gateway, Primary DNS, Secondary DNS)
c. Implement basic network commands
(1) Ping (2) Trace route (3) nslookup (4) pathping

Experiment-II

1)

a. Installing and configuring network simulation tool "Cisco Packet Tracer"
b. Explore Packet Tracer tool Real-Time mode
c. Explore physical and logical workspace

Experiment-III

1) Design a simple LAN network with two PCs PC1 and PC2, connect with a switch and check network connectivity between PC1 and PC2 using IPv4 and IPv6 configurations

Experiment-IV

1) Visualize and analyze a PDU in a network with Packet Tracer

Experiment-V

1) ARP analysis over a device connected to internet

Experiment-VI

1) Design a network and analyze ICMP messages

Experiment-VII

1) Design and configure a network with static route

Experiment-VIII

1) Design and configure a network using DVRP RIP

Experiment-IX

1) Design and configure a network using OSPF link state routing protocol

Experiment-X

1) Design and configure a VPN

Experiment-XI

1) Design and configure a NAT network

Experiment-XII

1) Analyze SNMP messages in a network

Laboratory Manual:

[1] *Advanced Computer Networks Laboratory Manual,* Dept. of CSE (Networks), KITS Warangal.

Reference Book:

[1] James F. Kurose, Keith W. Ross, *Computer networking, A Top Down approach*, 6th ed., United States of America: Pearson Education,2013.

[2] Shah, Ambawade, Mehra, Agarwal, *Advanced Computer Networks*, revised ed., New Delhi, Dreamtech, *Press, 2011*

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: identify network devices, install and configure network simulation tool
CO2: analyze PDU,ARP, ICMP in a network with Packet Tracer
CO3: create a network with static route, DVR RIP and OSPF link state routing protocol
CO4: create a VPN, NAT in a network, SNMP messages in network management

Course Articulation Matrix (CAM):U18CN507R22ADVANCED COMPUTER NETWORKS LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN507R22.1	2	2	3	1	3	-	-	1	1	1	-	2	2	3	3
CO2	U18CN507R22.2	2	3	3	2	3	-	-	1	1	1	-	2	2	3	3
CO3	U18CN507R22.3	2	3	3	3	3	-	-	1	1	1	-	2	2	3	3
CO4	U18CN507R22.4	2	3	3	3	3	-	-	1	1	1	-	2	2	3	3
U18CN507R22		2	2.75	3	2.25	3	-	-	1	1	1	-	2	2	3	3

U18CN508R22 INTERNET OF THINGS LABORATORY

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: configuring Raspberry Pi for IoT applications
LO2: running python program on Raspberry Pi for developing IoT applications
LO3: implementing cloud based IoT applications
LO4: usage of Pi camera and 7-segment display

List of Experiments

Experiment-I

1. Installation of OS onto Raspberry Pi
2. Start Raspberry Pi and try various Linux commands in command terminal window:
   i. *ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip*
   ii. *cat, more, less, ps*

Experiment-II

1. Start Raspberry Pi and try various Linux commands in command terminal window:
   i. *sudo, cron, chown, chgrp, pingetc*
   ii. *process related commands*
2. Run a python program on Pi to Read your name and print Hello message withname
3. Run a python program on Pi to Read two numbers and print their sum, difference, product anddivision
4. Run a python program on Pi to read a word and count characters in thatword

Experiment-III

1. Run a python program on Pi to Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input

Experiment-IV

1. Run a python program on Pi to demonstrate *while* loop
2. Run a python program on Pi to demonstrate *for* loop
3. Run a python program on Pi to demonstrate handle *Divide By Zero* Exception

Experiment-V

1. Run a python program on Pi to print current time for 10 times with an interval of 10 seconds.
2. Run a python program on Pi to Read a file and print the word count of each line
3. Run a python program on Pi to demonstrate Light an LED through Python program

Experiment-VI

1. Run a python program on Pi to get input from two switches and Switch ON corresponding LEDs

Experiment -VII

1. Run a python program on Pi to Flash an LED at a given on time and off time cycle, where the two times are taken from a file
2. Run a python program on Pi to Flash an LED based on *cron* output (acts as an alarm)

Experiment-VIII

1. Switch on a relay at a given time using *cron*, where the relay's contact terminals are connected to a load

Experiment-IX

1. Get the status of a bulb at a remote place (on the LAN) through web

Experiment-X

1. Get input from DHT sensor and upload on cloud
2. Get input from Ultrasonic sensor and upload on cloud

Experiment-XI

1. Working with LED, button, *pir* sensor

Experiment-XII (UNIT-IV)

1. Working with Pi camera
2. Working with 7-segment display using Raspberry PI

Laboratory Manual:

[1] *Internet of Things Laboratory Manual*, Dept. of CSE(Networks), KITSW.

Course Learning Outcomes (COs):

On completion of the course, students will be able to…

CO1: configure Rasberry Pi to develop IoT applications
CO2: implement python programs on Rasberry Pi for developing IoT applications
CO3: design cloud based IoT applications
CO4: develop real time IoT application using Pi camera and 7-segment display

Course Articulation Matrix (CAM): U18CN508R22 INTERNET OF THINGS LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN508R22.1	-	2	2	-	-	-	-	-	-	-	-	-	2	1	1
CO2	U18CN508R22.2	1	2	2	-	2	-	-	-	-	-	-	-	2	1	1
CO3	U18CN508R22.3	1	2	2	-	2	-	-	-	-	-	1	1	2	1	1
CO4	U18CN508R22.4	1	2	2	-	2	-	-	-	-	1	1	1	2	1	1
U18CN508R22		1	2	2	-	2	-	-	-	-	1	1	1	2	1	1

U18CN509 MACHINE LEARNING WITH PYTHON PROGRAMMING LABORATORY

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: Python basics, Conditional statements, Loop statements, Functions, Module and Packages
LO2: String Handling, List, Tuples, Dictionaries and File Handling in Python
LO3: Machine Learning libraries such as numpy, pandas, matplotlib, scikit-learn to implement classificationand clustering techniques
LO4: Machine Learning libraries such as keras, tensorflow and opencv to develop solutions using Neural networks and Ensemble learning techniques

List of Experiments

Experiment-I (Basics of Python and Conditional Statements)

1. Programs on Python Datatypes, Operators
2. Programs on Input (keyboard, command-line arguments, etc..) and Output
3. Program to read a 7-digit number as an input number using command-line arguments; Check for Palindrome number then, check the same is a Prime number, if both conditions stands true, then print the sum of the digits of the 7-digit number, Otherwise, If the given 7-digit number is not a palindrome then generate a random number of 1-digit nature from 0 to 9 then, search that digit in the given 7-digit number using Binary search
4. Read the Input as command line argument as follows:
   DD-MM-YYYY hh:mm
   Print the day number in the total number of 365 days or 366 days (if leap year). Also print
   number of hours : ____
   The number of minutes : ____
   Weekday Name : ____ (for the given DD)
   (Assume Year starts with weekday name as Monday)

Experiment-II (Loop statements and Functions)

Note: Implement the following programs using User-defined functions. There is no restriction on writing of user-defined functions as needed

1. Print the sum of even positioned Prime numbers in a given range of numbers
   Example: The given range is 1 to 50, then the numbers are: [2,3,5,7,11,13,17,19,23,29,31,37,41,43,47], Even positioned numbers are 3, 7, 13, 19, 29, 37, and 43. **Print the Sum**
   Write a Python program that uses Command-line arguments to take required inputs. If two arguments were supplied then, it should implement the above given problem, Else If more than two numbers are given then, find the biggest among those numbers in the list and generate those many Prime numbers and Implement the above given problem

2. Write the Python Program to compute the following series & pint the sum of 'K' terms

$$\text{Sum} = 1 + \frac{2!}{n*x^2} + \frac{4!}{n^2*x^3} + \frac{6!}{n^3*x^4} + \; - - -$$

3. Consider, one 8x8 matrix, it has to be filled with random integers from 1 to 8. You should check the following rules while filling:
   i. Each row (in sequence order) should be filled with a digit i.e. row1 with '1' and row2 with '2', etc
   ii. Each row should have only one element
   iii. An element can be filled anywhere in the row
   iv. row-m and row-n elements should not clash column-wise
   v. No consecutive columns also should be filled with elements
   vi. No element should be placed in same column (even row is differing)

   Write the Python code to implement the above requirements

Experiment-III (String Handling, List, Tuple and Dictionaries)

1. Programs on String Handling
2. Programs on Lists
3. Programs on Tuple
4. Programs on Dictionaries
5. Consider 5-Strings with different lengths (size of each string should be >=10), read from command line arguments. Now, your program has to take one random string from these 5-strings as input. Display the number of '#' symbols on screen, based on the length of your string taken as input. Now, your program has to read a character from the keyboard, if that character is present in you input string, then display that character should be printed in the place, where it is found. Remaining characters should be displayed with same '#' symbols. If same character occurs twice/ thrice/ more then, those many places should be printed with that character. If the character is not found, then display appropriate message. You've continue the same process till completion of the word is filled with correct characters. You've to make a counter, for each attempt of the guess. Display the number of attempts made for this guessing to complete the word is filled with all characters

   Example: Random Strings read from command-line arguments:
   Data mining techniques programming artificial intelligence
   (5-commandline arguments, of each size >= 10)
   Random string taken as: **artificial**
   Displaying it on the string as:
   Your word is:##########
   Enter your character: b
   Sorry, character is not found. Continue to enter your character.
   Enter your character: a
   Oh Good! Character found. a########a#
   Enter your character:i
   Oh Good! Character found. a##i#i#i#a#
   Complete the above process till all characters filled in place of # symbol Write a Python code to implement the above

6. **Mini-Sudoku:** Consider, a one 6x6 matrix, can be considered as six 3x2 matrices as a grid. You should fill all these matrices with symbols such as + * / - # % in each 3x2 grid

The following constraints must be satisfied while filling:

a. Each row and column must be filled with all 6 symbols.
b. No repeated symbols are allowed in the row / column.
c. Each grid also is filled with all 6 symbols

Write a python code to implement the above

7. Your Program to display the two 3X3 matrices in which each matrix should be composed of random numbers of 1-digit nature from 1 to 9. No digit should be repeated in each matrix. In each matrix, there should not be any collision among the in-placed positioned elements i.e., no 2 elements should be placed in the same positions in each matrix. If any collisions may occur, then generate an exception with a message "Collision Occurred"

Example: $\text{Matrix1} \rightarrow \begin{bmatrix} 1 & 6 & 7 \\ 2 & 5 & 8 \\ 3 & 4 & 9 \end{bmatrix} \text{Matrix2} \rightarrow \begin{bmatrix} 2 & 7 & 1 \\ 3 & 6 & 9 \\ 4 & 5 & 8 \end{bmatrix}$

Experiment-IV (File Handling and Numpy)

1. Consider an Input File with the data items of any 10 numbers of 5-digit nature. Send the Output to another file, which is having a list of numbers from 10 numbers of input file, whose sum of digits is an even number

Example:

Input File	**Output File** (Numbers whose sum of digits is an even number)
12354	12345
66577	66577
98123	;

Write a Python code to implement the above

2. Consider an Input File, which contains a paragraph of random text (minimum 150 characters of your own text. Text to be placed in 5- lines). Display the results as follows:

Total Number of Vowels (in entire file) : _____
Total Number of Vowels in each line : _____
Occurrence of each Vowel in the file as
****
A/a : ____
E/e : ____
I/I : ____
O/o : ____
U/u : ____
****

Write a Python code to implement the above

3. Consider an Input File, which contains bio-data of yours, it should have minimum of 100 characters in it. Print the details as

Order of Repeated Characters (in ascending)
Character: <No. of times repeated>
Character: <No. of times repeated>
……
Most Repeated Vowel in the file : _____
Total Number of Vowels : _____

Write a Python code to implement the above

4. Programs on Numpy: *numpy* array and operations on Arrays
   a. Indexing
   b. Masking and Filtering
   c. Transporting, Sorting, Ordering and Concatenating
   d. Aggregating

Experiment-V *(*Pandas and Matplotlib*)*
1. Install and setup *pandas* and *matplotlib* environment.
2. Programs on Pandas:
   a. Create a series from an n-d array
   b. Read data from various files (.csv, xls, etc…) using pandas
   c. Indexing and selecting data
   d. Data Frame

Experiment-VI (matplotlib, seaborn libraries – for Data Visualization)
Note: Consider your own dataset or download a public dataset of machine learning
Use the following scenarios for visualizing the data
   a. Budget a Long Drive
   b. Compare Unemployment Rates with Gains in Stock Market
   c. Compare Salaries of Batsmen with the Average Runs They Score per Game
   d. Compare the Dates in a Month with the Monthly Salary
1. Develop a program to draw a simple line plot
2. Develop a program to draw a histogram plot
3. Customize plots and experiment with different maps plots

Experiment -VII
1. Installation procedure for *Anaconda IDE*, *Jupyter,* Python library: *scikit-learn*
   Explore menu items of above software tools

Experiment -VIII (Classification Algorithm-Linear regression)
2. Develop a Python code on Linear Regression algorithm under Classification
   (Sample ideas to workout with Linear Regression algorithm are:
   a. Budget a Long Drive
   b. Compare Unemployment Rates with Gains in Stock Market
   c. Compare Salaries of Batsmen with the Average Runs They Score per Game
   d. Compare the Dates in a Month with the Monthly Salary
   e. Compare Average Global Temperatures and Levels of Pollution
   f. Compare Local Temperature with the Amount of Rain
   g. Compare Average age of Humans with the Amount of Their Sleep
   h. Compare the Percentage of Sediments in River with its Discharge

i. Compare Budgets of National Film Awards-nominated Movies with the number Movies Winning These Awards

etc.,)

Consider the ideas given above or any of your own. Develop the Machine Learning - Linear Regression technique code using Python.

Experiment-IX (Decision-Tree Algorithm)

1. Develop a Python code to *Predict the loan eligibility process* from given data using Decision – Tree algorithm under Classification
   (Sample ideas to be developed with the use of Decision Trees are as follows:
   a. A person eligible for a loan or not based on his financial status, family member, salary, etc. can be decided on a decision tree
   b. Credit card frauds
   c. Bank schemes and offers
   d. Loan defaults
   e. A patient is suffering from a disease or not based on conditions such as age, weight, sex and other factors
   f. Deciding the effect of the medicine based on factors such as composition, period of manufacture, etc
   g. In colleges and universities, the shortlisting of a student can be decided based upon his/her merit scores, attendance, overall score etc
   h. Promotional strategy of faculties present in the universities

   Etc.,)

Consider any one of the above mentioned ideas or take your own, and implement using Machine Learning Decision – Tree Algorithm using Python

Experiment-X (Clustering algorithm)

1. Consider your own idea(s) or given idea(s) in the above **Experiments (VIII & IX)**, and Implement a Python code using Machine Learning *Clustering* algorithm

Experiment-XI (Convolutional Neural networks)

1. Installation of *keras*, *tensorflow*, *scikit-learn* and *data visualization* libraries
2. Consider your own example(s) or idea(s) to develop a Python code using Neural Networks. (Example ideas are *Image recognition*, *Object Detection*, *Image classification*etc…)
3. Develop a Python code to demonstrate *Back propagation* technique in Neural networks

Experiment-XII (Ensemble Learning)

1. Consider your own example(s) or above ideas in **Experiments (VIII & IX)** to develop a Python code on Ensemble Learning Technique

Laboratory Manual:

[1] *Machine Learning with Python Programming Laboratory Manual,* prepared by Department of CSE (Networks), KITSW.

Reference Book:

[1] Reema Thareja, *Python Programming using problem solving approach*, New Delhi: Oxford university press, 2017

[2] Jake VanderPlas, *Python Data Science Handbook- Essential Tools for Working with Data*, California: O'Reilly Media, Inc., 2016

[3] Jason Bell, "*Machine Learning: Hands-On for Developers and Technical Professionals*", John Wiley & Sons, First Edition, ISBN-13: 978-1118889060, 2014

Course Learning Outcomes (COs):

On completion of the course, students will be able to…

CO1: develop Python programs using control statements, functions, modules and packages

CO2: write the python programs using strings, list, tuples, dictionaries and files

CO3: design the python programs on classification and clustering techniques using numpy, pandas, matplotlib and scikit-learn python libraries

CO4: create solutions using neural networks with the help of keras, tensorflow and opencv libraries

Course Articulation Matrix (CAM): U18CN509 MACHINE LEARNING WITH PYTHON PROGRAMMING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN509.1	2	2	2	2	2	-	-	1	1	1	-	1	2	2	2
CO2	U18CN509.2	3	3	3	3	3	-	-	1	1	1	-	1	2	2	2
CO3	U18CN509.3	3	3	3	3	3	-	-	1	1	1	-	1	2	2	2
CO4	U18CN509.4	3	3	3	3	3	-	-	1	1	1	-	1	2	2	2
U18CN509		2.75	2.75	2.75	2.75	2.75	-	-	1	1	1	-	1	2	2	2

U18CN510 SEMINAR

Class: B.Tech. V- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 Marks
End Semester Exam	--

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: selecting topic, referring to peer reviewed journals / technical magazines / conference proceedings
LO2: literature review and well-documented report writing
LO3: creating PPTs and effective technical presentation
LO4: preparing a technical paper in scientific journal style &format

Student has to give independent seminar on the state-of-the-art technical topics relevant to their program of study, which would supplement and complement the program assigned to each student

Guidelines:

1. The HoD shall constitute a Department Seminar Evaluation Committee (DSEC)
2. DSEC shall allot a faculty supervisor to each student for guiding on
   i. selection of topic
   ii. literature survey and work to be carried out
   iii. preparing a report in proper format
   iv. effective seminar presentation
3. There shall be only Continuous Internal Evaluation (CIE) for seminar
4. The CIE for seminar is as follows:

Assessment	Weightage
Seminar Supervisor Assessment	20%
Seminar Report	30%
Seminar Paper	20%
DSEC Assessment: *Oral presentation with PPT and viva-voce*	30%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce toqualify for course evaluation

(a) **Seminar Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by *DSEC*

(c) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(d) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DSEC* as per the schedule notified by the department

(e) The student has to register for the Seminar as supplementary examination in the following cases:

i) he/she is absent for oral presentation and viva-voce

ii) he/she fails to submit the report in prescribed format

iii) he/she fails to fulfill the requirements of seminar evaluation as per specified guidelines

(f) Communication with CoE

i) The CoE shall send a list of students registered for supplementary to the HoD concerned

ii) The DSEC, duly constituted by the HoD, shall conduct seminar evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: select current topics in their engineering discipline & allied areas from peer reviewed journals / technical magazines/ conference proceedings
CO2: demonstrate the skills for performing literature survey, identify gaps, analyze the technical content and prepare a well-documented seminar report
CO3: create informative PPT and demonstrate communication skills through effective oral presentation showing knowledge on the subject & sensitivity towards social impact of the seminar topic
CO4: write a "seminar paper" in scientific journal style & format from the prepared seminar report

Course Articulation Matrix (CAM):U18CN510 SEMINAR

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN510.1	1	1	-	1	1	-	1	2	2	2	1	2	1	1	1
CO2	U18CN510.2	1	1	-	-	-	-	-	2	2	2	-	2	1	1	1
CO3	U18CN510.3	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1
CO4	U18CN510.4	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1
U18CN510		1	1-	-	1	1	-	1	2	2	2	1	2	1	1	1

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
VI-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[5Th+3P+1MC+Miniproject]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	MC	U18MH601	Universal Human Values-II	2	1	-	-	10	30	40	60	100
2	OE	U18OE602	Open Elective - III	3	-	-	3	10	30	40	60	100
3	PE	U18CN603	Professional Elective - II / MOOC-II	3	-	-	3	10	30	40	60	100
4	PCC	U18CN604R22	Software Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CN605	Cloud Computing	3	-	-	3	10	30	40	60	100
6	PCC	U18CN606R22	Cryptography and Network Security	3	-	-	3	10	30	40	60	100
7	PCC	U18CN607R22	Cryptography and Network Security Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18AI608	Cloud Computing Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN609R22	Advanced Java Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18AI610	Mini Project	-	-	2	1	100	-	100	-	100
			Total:	17	1	8	19	280	180	460	540	1000
***Additional Learning**:* *Maximum credits allowed for Honours/Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for** students opted for **Honours / Minor students:				-	-	-	*19+7*	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 26** **Total Credits: 19**

Open Elective- III:	Professional Elective-II / MOOC-II:
U18OE602A: Disaster Management	U18CN603A: Mobile Computing
U18OE602B: Project Management	U18CN603B: Wireless Sensor Networks
U18OE602C: Professional Ethics in Engineer	U18CN603C: Wireless Communication
U18OE602D: Rural Technology and Communication Development	U18CN603M: MOOCs Course

U18MH601 UNIVERSAL HUMAN VALUES-II

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
2	1	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

*** Pre-requisite:U18MH111 Universal Human Values - I (Induction Programme)**

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: self-exploration, happiness and prosperity as the process of value education
LO2: harmony in the human being- self & family
LO3: co-existence of human being with society & nature
LO4: professional ethics, commitment and courage to act

UNIT – I (6+3)

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Recapitulation from Universal Human Values – I *(Induction programme)*
Self-Exploration: Its content and process, Natural acceptance and experiential validation – As the process for self-exploration
Continuous Happiness and Prosperity: A look at basic human aspirations, Right understanding, Relationship and physical facility - The basic requirement for fulfillment of aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly: A critical appraisal of the current scenario, Method to fulfill the above human aspirations - Understanding and living in harmony at various levels

UNIT - II (6+3)

Understanding Harmony in the Human Being- Harmony in Myself & Family:
Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Happiness and physical facility; Understanding the 'Body' as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of 'I' with the 'Body' - Sanyam and Health; Correct appraisal of physical needs, Meaning of prosperity in detail, Programs to ensure Sanyam and Health
Harmony in Family: Understanding values in human - Human relationship; Meaning of justice (Nine universal values in relationships), Program for its fulfillment to ensure mutual happiness, Trust and respect as the foundational values of relationship, Understanding the meaning of trust, Difference between intention and competence; Understanding the meaning of respect, Difference between respect and differentiation, The other salient values in relationship

UNIT - III (6+3)

Understanding Harmony with Society, Nature & Existence:

Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust) and Co-existence as comprehensive human goals, Visualizing a universal harmonious order in society – Undivided society; Universal order - From family to world family

Understanding the harmony in the nature: Interconnectedness and mutual fulfillment among the four orders of nature - Recyclability and self-regulation in nature

Whole Existence as Co-existence: Understanding existence as co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT - IV (6+3)

Implications of Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of ethical human conduct, Basis for Humanistic education, Humanistic constitution and Humanistic universal order

Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems and c) Ability to identify and develop appropriate technologies and management patterns for above production systems

Case studies: Case studies of typical holistic technologies, Management models and production systems, Strategy for transition from the present state to Universal human order – a) At the level of individual: As socially and ecologically responsible engineers, technologists and managers b) At the level of society: As mutually enriching institutions and organizations

Text Book:

[1]R.R.Gaur,R.Sangal and G.P.Bagaria ,*Human Values and Professional Ethics*, NewDelhi: ExcelBooks, 2010.

Reference Books:

[1] A. Nagaraj, *Jeevan Vidya: Ek Parichaya*, Raipur: Jeevan Vidya Prakashan, Amarkantak, 2018.

[2] A.N. Tripathi, *Human Values*, 3rd ed. New Delhi: New Age International Publisher, 2019.

[3] M. Govindrajan, S. Natrajan& V.S. Senthil Kumar, *Engineering Ethics (includes Human Values)*, 12th ed. Haryana: PHI Learning Pvt. Ltd., 2011.

[4] Jayshree Suresh, B. S. Raghavan, *Human Values & Professional Ethics*, 4th ed.New Delhi: S. Chand & Co. Ltd., 2012

Additional Resources:

[1]R.R Gaur, R Sangal, G P Bagaria, *A foundation course in Human Values and professional Ethics (Teacher's Manual)*, New Delhi: Excel books, 2010.

[2]A set of DVDs containing - *Video of Teachers' Orientation Program* - PPTs of Lectures and Practice Sessions (Audio-visual material for use in the practice sessions)

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: interpret the importance of continuous happiness & prosperity through self exploration and imbibe skills to examine harmony
CO2: appraise the concept of sentience, distinguish between intention & competence and prioritize human values in relationships
CO3: build fearlessness & co-existence as comprehensive human goal and agree upon interconnectedness & mutual fulfilment
CO4: assess the understanding of harmony, adapt professional ethics and take part in augmenting universal human order

Course Articulation Matrix (CAM):U18MH601 UNIVERSAL HUMAN VALUES– II

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18MH601.1	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO2	U18MH601.2	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO3	U18MH601.3	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO4	U18MH601.4	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
U18MH601		-	-	-	-	-	1	-	2	1	1	-	2	-	-	1

U18OE602A DISASTER MANAGEMENT

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: disaster types, its impacts & national policy on disaster management

LO2: prevention, preparedness and mitigation measures for different disasters, emergency support functions and relief camps

LO3: different types of vulnerability, macroeconomic, financial management of disaster and its related losses

LO4: disaster management for infrastructure, treatment of plants, geo spatial information in agriculture, multimedia technology in disaster risk management and training

UNIT – I (9)

Introduction & Principles of Disaster Management: Nature - Development, Hazards and disasters; Natural disasters - Earth quakes, Floods, Fire, Landslides, Cyclones, Tsunamis, Nuclear; Chemical dimensions and Typology of disasters - Public health disasters, National policy on disaster management

UNIT - II (9)

Prevention Preparedness and Mitigation Measures: Prevention, Preparedness & mitigation measures for various disasters, Post disaster reliefs and logistics management, Emergency support functions and their coordination mechanism, Resources and material management, Management of relief camp

UNIT - III (9)

Risk and Vulnerability: Building codes and land use planning, Social vulnerability, Environmental vulnerability, Macroeconomic management and sustainable development, Climate change, Risk rendition, Financial management of disaster and related losses

UNIT - IV (6+3)

Role of Technology in Disaster Management: Disaster Management for infrastructures, Taxonomy of infrastructure, Treatment plants and process facilities, Electrical sub stations, Roads and Bridges, Geo spatial information in agriculture, Drought assessment, Multimedia technology in disaster risk management and training

Text Book:

[1] Rajib shah and R.R Krishnamurthy, *Disaster management–Global Challenges and local solutions,* Hyderabad: Universities Press (India) Pvt. Ltd., 2009.

Reference Books:

[1] Satish Modh, *Introduction to Disaster management*, Bengaluru: Macmillan India Ltd., 2010.

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: classify the disasters and discuss natural & non-natural disasters, their implications, the institutional & legal framework for national policy on disaster management in India
CO2: identify mitigation strategies, preparedness & prevention measures and prioritizes the rescue & relief operations to reduce the impact of a disaster
CO3: list the vulnerable groups in disaster; examine the concepts of macroeconomic & sustainability & impact of disaster on development
CO4: discuss disaster management for infrastructure, utilize geospatial information in agriculture and apply multimedia technology for disaster risk management &training

Course Articulation Matrix (CAM):U18OE602A DISASTER MANAGEMENT

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE602A.1	-	-	-	-	-	2	2	1	-	-	1	1	-	-	-
CO2	U18OE602A.2	-	-	-	-	-	2	2	1	-	-	1	1	-	-	-
CO3	U18OE602A.3	-	-	-	-	-	2	2	1	-	-	1	1	-	-	-
CO4	U18OE602A.4	-	-	-	-	-	2	2	1	-	-	1	1	-	-	-
U18OE602A		-	-	-	-	-	2	2	1	-	-	1	1	-	-	-

U18OE602B PROJECT MANAGEMENT

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: role of project manager, organization and management functions
LO2: effective time &conflict management, ethics &professional responsibilities
LO3: project planning, scheduling and budgeting
LO4: cost control, risk management and quality control techniques

UNIT – I (9)

Project Management: Understanding project management, Role of project manager, Classification of projects, Project management growth, Definitions and Concepts, Organizational structures - Organizing and staffing the project management office and team; Management functions

UNIT - II (9)

Time and Conflict Management: Understanding time management, Time management forms, Effective time management, Stress and burnout, Conflict environment, Conflict resolution, Management of conflicts, Performance measurement, Financial compensation and rewards, Morality, ethics, Corporate culture, Professional responsibilities, Success variables, Working with executives

UNIT - III (9)

Project planning: General planning, Life-cycle phases, Proposal preparation, Project planning, The statement of work, Project specifications, Milestone schedules, Work breakdown structure, Executive role in planning, The planning cycle, Handling project phase outs and transfers, Stopping projects, Scheduling techniques - CPM and PERT, Pricing and estimating

UNIT - IV (9)

Cost and quality control: Understanding cost control, Earned Value Measurement System, Cost control problems, Methodology for trade-off analysis, Risk management process, Risk analysis, Risk responses, Monitoring and control of risks, Contract management, Quality management concepts, Cost of quality, Quality control techniques

Text Book:

[1] Harold Kerzner, P*roject Management: A Systems Approach to Planning, Scheduling and Controlling*, 10th ed. Hoboken, NJ: John Wiley & Sons Inc., 2009.

Reference Books:

[1] Jack R Meredith & Samuel J mantel Jr., *Project Management: A Managerial Approach*, 8th ed.

Hoboken,NJ: John Wiley & Sons Inc., 2012
[2] John M Nicholas & Herman Steyn, *Project Management for Business, Engineering and Technology,4thed. Abingdon, UK: Taylor & Francis, 2012*
[3] Adedeji B. Badiru, *Project Management: Systems, Principles and Applications*, Florida. USA: CRC Press, 2012

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, student's will be able to…

CO1: evaluate the desirable characteristics of effective project managers
CO2: plan to resolve issues in conflicting environments
CO3 apply appropriate approaches to plan a new project in-line with project schedule & suitable budget
CO4: estimate the risks to be encountered in a new project and apply appropriate techniques to assess & improve ongoing project performance

Course Articulation Matrix (CAM):U18OE602B PROJECT MANAGEMENT

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE602B.1	-	-	-	-	-	1	-	-	-	1	1	-	-	-	-
CO2	U18OE602B.2	-	-	-	-	-	1	-	2	-	1	1	-	-	-	-
CO3	U18OE602B.3	1	1	-	-	-	1	-	-	-	1	1	-	-	-	-
CO4	U18OE602B.4	1	1	-	-	-	1	-	-	-	1	1	-	-	-	-
U18OE602B		1	1	-	-	-	1	-	2	-	1	1	-	-	-	-

U18OE602C PROFESSIONAL ETHICS IN ENGINEERING

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: human values and engineering ethics
LO2: professionalism, theory of virtues and code of ethics
LO3: safety & risk benefit analysis, professional and intellectual property rights
LO4: environmental & computer ethics and various roles of engineers in a company

UNIT – I (9)

Human Values: Morals, Values & ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Co- operation, Commitment, Empathy, Self-confidence, Character, Spirituality

Engineering Ethics: Senses of "Engineering Ethics", Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory, Gilligan's theory - Consensus and controversy

UNIT - II (9)

Profession and professionalism: Profession and its attributes, Models of professional roles **Theory of Virtues**: Definition of virtue and theories of virtues, Self-respect, Responsibility and senses, Modern theories of virtues, Uses of ethical theories

Engineering as social experimentation: Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, A balanced outlook on law, The challenger case study

UNIT - III (9)

Safety, Responsibilities and Rights: Safety and risk, Assessment of safety and risk, Risk benefit analysis and reducing risk - Three Mile Island and Chernobyl case studies; Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflicts of interest, Professional rights, Employee rights, Intellectual Property Rights (IPR), Discrimination

UNIT - IV (9)

Global Issues: Multinational corporations - Environmental ethics, Computer ethics, Engineers as managers, Consulting engineers, Engineers as expert witnesses and advisors, Moral leadership, Sample code of ethics (*Specific to a particular engineering discipline*)

Text Book:

[1] *D.R. Kiran, Professional Ethics and Human Values, New York: McGraw Hill, 2013.*

Reference Books:

[1] Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Professional Ethics and Human Values,* New Delhi: Prentice Hall of India, 2013
[2] Mike Martin and Roland Schinzinger, *Ethics in Engineering*, 4th ed. New York: McGraw Hill, 2014
[3] Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: identify the need for human values, morals & ethics and apply Gilligan's & Kohlberg's theories for morale development
CO2: identify the desired characteristics of a professional & the need for code of ethics & balanced outlook on law
CO3: estimate the safety margin & threshold level and describe the procedure for obtaining a patent
CO4: analyze the role of engineer in multinational companies as an advisor, consultant &manager

Course Articulation Matrix (CAM):U18OE602C PROFESSIONAL ETHICS IN ENGINEERING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE602C.1	-	-	-	-	-	1	-	2	1	-	-	1	-	-	-
CO2	U18OE602C.2	-	-	-	-	-	1	-	2	1	-	-	1	-	-	-
CO3	U18OE602C.3	-	-	-	-	-	1	-	2	1	-	-	1	-	-	-
CO4	U18OE602C.4	-	-	-	-	-	1	-	2	1	-	-	1	-	-	-
U18OE602C		-	-	-	-	-	1	-	2	1	-	-	1	-	-	-

U18OE602D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: building technologies, modern agricultural implements and food processing methods

LO2: medicinal & aromatic plants to fulfill the needs of pharmaceutical industries and rural energy for eradication of drudgery

LO3: purification of drinking water, rain water harvesting and employment generating technologies in rural areas

LO4: objectives & characteristics of community development, need for community mobilization and approaches for community organization

UNIT – I (9)

Technologies and Process: Building materials and components - Micro concrete roofing tiles, Water &fire proof mud walls and thatch, Red mud/rice husk cement, Types of bricks, Ferro-cement water tanks and other products, Cement blocks, Preservation of mud walls, Agricultural implements-Naveen sickle, Animal drawn digger, Grubber weeder, Self propelled reaper, Seed drill, Improved bakhar

Food Processing: Fruit and vegetable preservation - Process flow sheet, Scale of operation, Economic feasibility, Source of technology; Soya milk - Process, Economics; Dehydration of fruits and vegetables, Cultivation of oyster mushroom - Preparation of beds, Spawning, Removal of bags for production of mushrooms, Harvesting and marketing, Economics, Process flow sheet, Source of technology

UNIT - II (9)

Medicinal and Aromatic plants: Plants and its use, Aromatic plants, Cymbopogons, Geranium, Manufacturing of juice, Gel and powder, Rural energy - Cultivation ofjatrophacurcusandproductionofbiodiesel,Lowcostbriquettedfuel,Solarcookersandoven, Solar drier, Bio-mass gasifier

Bio-fertilizers: Introduction, Vermi compost, Improvement over traditional technology/process, Techno economics, Cost of production, Utilization of fly ash for wasteland development and agriculture

UNIT - III (9)

Purification of Drinking water: **Slow sand filtration unit, Iron removal plant connected to hand pump, Chlorine tablets, Pot chlorination of wells, Solar still, Fluoride removal,Rain water harvesting through roof top, Rain water harvesting through percolation tank, Check dams, Recharging of dug wells**

Employment Generating Technologies: Detergent powder and cake - Process, Process for liquid detergent, Carcass utilization - Improvement over traditional technology, Flow chart, Process, Capital investment; Indigo blue - Dye, Organic plant production, Dye extraction techniques, Aspects of

indigo market, Economics; Modernization of bamboo based industries - Process for bamboo mat making, Machinery, Products, Agarbatti manufacturing; Vegetable tanning of leathers - Raw material, Soaking, Liming, Reliming, Deliming, Pretanning, Malani, Setting, Yield

UNIT - IV (9)

Community Development: Community organization- Definition, Need, Functions, Principles, Stages; Community development - Definition, Need, Objectives, Characteristics, Elements, Indicators; Differences between community organization and community development

Community Mobilization: Need, Benefits, Preparing, Initial contact with community, Coordinating, Functions of the community, Challenges, Techniques for mobilizing community, Community contributions, Leadership and capacity building,Community participation, Role of community worker in community mobilization, Models of community organization practice - Local development model, Social planning model, Social action model, Approaches to community organization

Text Book:

[1] M.S.Virdi, *Sustainable Rural Technology,* New Delhi: Daya Publishing House, 2009.
[2] Asha Ramagonda Patil, *Community Organization and Development: An Indian Perspective,* New Delhi: Prentice Hall of India, 2013

Reference Books:

[1] Punia Rd Roy, *Rural Technology*, New Delhi: Satya Prakashan Publishers, 2009
[2] S.B. Verma, S.K.Jiloka, Kannaki Das, *Rural Education and Technology*, New Delhi: Deep & Deep Publications Pvt. Ltd., 2006
[3] Edwards, Allen David and Dorothy G.Jones, *Community and Community Development*, The Hague, Netherlands: Mouton, 1976
[4] Lean, Mary, *Bread, Bricks and Belief: Communities in Charge of Their Future*, West Hartford, US: Kumarian Press, 1995
[5] Heskin, Allen David, *The Struggle for Community*, Colorado, US: West View Press, 1991
[6] Clinard, Marshall Barron, *Slums and Community Development: Experiments in Self- Help*, Mumbai: Free Press, 1970

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: discuss various building technologies, modern agricultural implements and food processing methods which can be implemented in rural areas

CO2: identify major medicinal plants that are required for pharmaceutical companies & alternative fuel that meets substantial oil need in the country and the need and usage of bio- fertilizers

CO3: analyze several cost effective technologies for purification of water, rain water harvesting techniques for collection & storage of rain water and examine the employment generating technologies in tribal/ rural areas

CO4: distinguish between community organization and community development and identify techniques for community mobilization & approaches to community organization for social change

Course Articulation Matrix (CAM): U18OE602D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE602D.1	-	-	1	-	-	1	2	-	-	-	-	1	-	-	-
CO2	U18OE602D.2	-	-	1	-	-	1	2	-	-	-	-	1	-	-	-
CO3	U18OE602D.3	-	-	1	-	-	1	2	-	-	-	-	1	-	-	-
CO4	U18OE602D.4	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-
U18OE602D		-	-	1	-	-	1	2	-	-	-	-	1	-	-	-

U18CN603A MOBILE COMPUTING

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: fundamental concept of mobile computing paradigm, its novel applications and limitations
LO2: components and working of various mobile devices and systems
LO3: functionalities of mobile networks namely network layer and transport layer
LO4: database issues in mobile environment & mobile application development platforms

UNIT – I (9)

Introduction: Mobile communications, Modulation methods and standards for voice-oriented data communication standards, Modulation methods and standards for data and voice communication, Super 3G and 4G: 3GPP LTE and WiMax 802.16e standards, Features of 4G: LTE Advanced and Advanced WiMax 802.16m,Wireless personal area network, Wireless local area network and Internet access, Near-field communication

Mobile computing: Novel applications, Limitations of mobile computing, Mobile computing architecture, Programming languages, Functions of operating systems, Functions of middleware for mobile systems, Mobile computing architectural layers and protocols

UNIT - II (9)

Mobile devices and Systems: Cellular networks and frequency reuse cellular networks for mobile smart phones, Frequency reuse in networks, Capacity enhancement in networks

Smart Mobiles and Systems: Smartphone features, Digital music players, Bluetooth and Wi-Fi, GPS, Gyroscope and accelerometer, Digital compass and magnetometer, Camera 2D and 3D Graphics and HDMI

Handheld devices: Mac OS 4 based devices, Android, Linux based mobile devices, E-book reader

Smart Systems: Smartcards, Smart labels, RFID, Smart tokens, Sensors, Actuators, Sensors and actuators for robotic systems, Smart appliances and Set-top boxes

UNIT - III (9)

4G Networks: **4G Networks-Requirements and design, Modulation and multiplexing techniques for 4G, High speed OFDM packet access Super 3G, LTE advanced, WiMax advanced (802.16m)** Mobile Network Layer: **IP and Mobile IP network layers, Packet delivery and handover management, Location management, Registration, Tunneling and Encapsulation, Route optimization, DHCP** Mobile Transport Layer: **Conventional TCP/IP protocols, Indirect TCP, Snooping TCP and Mobile TCP** Database and Mobile Computing: **Database transactional models, Query processing, Data recovery process, Database hoarding and caching, Client-Server computing for mobile computing and adaption**

UNIT - IV (9)

Data Dissemination: Communication asymmetry, Classification of data-delivery mechanisms, Data dissemination broadcast models, Selective tuning and indexing techniques

Data Synchronization: Synchronization in mobile computing systems, Domain dependent specific data synchronization, Personal information manager, Strategies, Synchronization software, Synchronization protocols, Mobile application development platforms

Text Book:

[1] Jochen Schiller, *Mobile Communications*, 2nd ed. Addison-Wesley, 2008. (Chapters 8, 9).
[2] Raj Kamal, *Mobile Computing*, 3rd ed. Oxford University Press, 2018. (Chapters 2, 3, 4, 6 and 8)

Reference Books:

[1] Ivan Stojmenovic, *Handbook of Wireless Networks and Mobile Computing*, 2nd ed. John Wiley and sons, INC, 2002
[2] Reza Behravanfar, *Mobile Computing Principles: Designing and Development Mobile Applications & with UML and XML*, 1st ed. Cambridge University Press, 2005

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: make use of the concepts of mobile computing such as modulation methods and standards for data and voice communication standards using 4G networks
CO2: analyze the cellular systems features and components using different operating system-based devices
CO3: analyze the packet delivery and handover management methodology through the mobile network layer
CO4: apply data dissemination and synchronization to develop different mobile applications

Course Articulation Matrix (CAM): U18CN603A MOBILE COMPUTING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN603A.1	2	2	2	2	1	-	-	1	1	1	-	2	2	1	2
CO2	U18CN603A.2	2	2	2	2	1	-	-	1	1	1	-	2	2	1	2
CO3	U18CN603A.3	3	3	2	3	1	-	-	1	1	1	-	2	2	1	2
CO4	U18CN603A.4	3	3	3	3	1	-	-	1	1	1	-	2	3	1	3
U18CN603A		2.5	2.5	2.25	2.5	1	-	-	1	1	1	-	2	2.25	1	2.25

U18CN603B WIRELESS SENSOR NETWORKS

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: fundamental concepts, applications and technology of wireless sensor networks
LO2: medium access control protocols and routing protocols for wireless sensor networks with case studies
LO3: design issues, performance, examples of transport control protocols for wireless sensor networks and principles and architecture of middleware for wireless sensor networks
LO4: models, design issues, architecture of network management for wireless sensor networks and operating system design issues and performance modeling of WSNs

UNIT – I (9)

Overview of Wireless Sensor Networks: Introduction, Basic overview of the technology **Applications of Wireless Sensor Networks:** Introduction, Background, Examples of category-2 WSN applications and Examples of Category-1 WSN applications

Basic Wireless Sensor Technology: Sensor node technology, Sensor taxonomy, Wireless node operating environment, Wireless node trends

UNIT - II (9)

MAC Protocols for Wireless Sensor Networks: Introduction, Background, Fundamentals of MAC protocols, MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR WPANs standard case study

Routing Protocols for Wireless Sensor Networks: Introduction, Background, Data dissemination and gathering, Routing challenges and design issues, Routing strategies in wireless sensor networks

UNIT - III (9)

Transport Control Protocols for Wireless Sensor Networks: Traditional transport control protocols, Transport protocol design issues, Examples of existing transport control protocols, Performance of transport control protocols

Middleware for Wireless Sensor Networks: Introduction, WSN middleware principles, Middleware architecture, Existing middleware

UNIT - IV (9)

Network Management for Wireless Sensor Networks: Introduction, Network management requirements, Traditional network management models, Network management design issues, Network management architecture -MANNA, Naming and Localization

Operating Systems for Wireless Sensor Networks: Introduction, Operating system design issues, Examples of operating systems

Performance and Traffic Management: Introduction, Background, WSN design issues, Performance modeling of WSNs, Case study- Simple computation of the system life span

Text Book:

[1] Kazem Sohraby, Daniel Minoli and TaiebZnati, *Wireless Sensor Networks- Technology, Protocols and applications*, New Jersy: John Wiley & Sons. 2007

Reference Books:

[1] C.S. Raghavendra, K. M. Sivalingam, T. Znati, *Wireless Sensor Networks*, New York: Springer US, 2006
[2] Holger Karl and Andreas Willig, *Protocols and Architectures for Wireless Sensor Networks,* Chichester: John Wiley & Sons. 2007
[3] Ankur Dumka, Sandip K. Chaurasiya, Arindam Biswas, Hardwari Lal Mandoria, *A Complete Guide to Wireless Sensor Networks from Inception to Current Trends,* Florida: CRC Press, 2019
[4] Feng Zhao, Leonidas Guibas, *Wireless Sensor Networks-An Information processing approach,* Burlington: Morgan Kaufmann, 2004

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, student's will be able to…

CO1: develop wireless sensor networks to support a wide range of applications
CO2 design medium access control protocols and routing protocols for wireless sensor networks
CO3: assess the performance of transport control protocols and understand the principles & architecture of middleware for wireless sensor networks
CO4: design new network management models by identifying the design issues of network management & operating system for wireless sensor networks

Course Articulation Matrix (CAM): U18CN603B WIRELESS SENSOR NETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN603B.1	2	2	2	1	-	-	-	1	1	1	-	1	1	1	-
CO2	U18CN603B.2	2	2	2	-	-	-	-	1	1	1	-	1	1	2	-
CO3	U18CN603B.3	2	2	2	-	1	-	-	1	1	1	-	1	1	2	-
CO4	U18CN603B.4	2	2	2	1	1	-	-	1	1	1	-	1	1	1	-
U18CN603B		2	2	2	1	1	-	-	1	1	1	-	1	1	1.5	-

U18CN603C WIRELESS COMMUNICATIONS

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: evolution of wireless communications and modern wireless communications systems

LO2: the design of a cellular system and mobile radio propagation

LO3: modulation techniques for mobile radio, pulse shaping techniques and linear modulation techniques

LO4: multiple access techniques for wireless communications and wireless systems & standards

UNIT – I (9)

Introduction to Wireless communications systems: Evolution of mobile radio communications, mobile radio systems around the world, examples of wireless communication systems, trends in cellular radio and personal communications

Modern Wireless communication systems: Second generation (2G) cellular networks, third generation (3G) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks(WLANs), bluetooth and personal area networks(PANs)

UNIT - II (9)

The Cellular concept – system design Fundamentals: Introduction, frequency reuse – channel assignment strategies - hand off strategies - interference & system capacity, trunking & grade of service – Improving coverage& capacity in cellular systems

Mobile radio propagation: Large-scale path loss – Introduction to radio wave propagation, free space propagation model, the three basic propagation mechanisms, outdoor propagation models, indoor propagation models, **Small scale fading and multipath -** small scale multipath propagation, small scale multipath measurements, types of small-scale fading

UNIT - III (9)

Modulation techniques for mobile radio: Frequency modulation(FM) Vs Amplitude modulation(AM), Amplitude modulation - single sideband AM and Demodulation of AM signals, Angle modulation – spectra and bandwidth of FM signals, FM Modulation and detection techniques, digital modulation, line coding

Pulse shaping techniques: Nyquist criterion for ISI cancellation, raised cosine rolloff filter, gaussian pulse-shaping filter, Linear modulation techniques: Binary phase shift keying (BPSK), differential phase shift keying (DPSK), quadrature phase shift keying (QPSK), QPSK transmission and detection techniques, M-ary phase shift Keying(MPSK), M-ary phase quadrature amplitude modulation(QAM)

UNIT - IV (9)

Multiple access techniques for wireless communications: Introduction to multiple access, frequency division multiple access(FDMA), time division multiple access(TDMA), spread spectrum multiple access, space division multiple access(SDMA), carrier sense multiple access(CSMA), orthogonal frequency division multiplexing(OFDM), packet radio, capacity of cellular systems

Wireless Systems and Standards: Global System for Mobile(GSM), Personal Access Communication Systems(PACS)

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.
Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.
Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Text Book:

[1] Rappaport, T.S., *Wireless communications*, 2nd ed.,New Jersey: PearsonEducation,2010

Reference Books:

[1] Andrea Goldsmith, *Wireless Communication*,2nd ed., Cambridge: Cambridge University Press, 2011
[2] Van Nee, R. and Ramji Prasad, *OFDM for wireless multimedia communications,* Artech House,2000
[3] David Tse and Pramod Viswanath, *Fundamentals of Wireless Communication*, Cambridge University Press,2005
[4] Upena Dalal, *Wireless Communication,* Oxford University Press, 2009

Course Learning Outcomes (COs):
On completion of this course, student's will be able to…

CO1: utilize the evolution and generations of wireless communications
CO2 analyze the cellular system based on resource availability and traffic demands
CO3: make use of modulation techniques for mobile radio
CO4: utilize multiple access techniques for wireless communications and wireless systems &standards

Course Articulation Matrix (CAM): U18CN603C WIRELESS COMMUNICATIONS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN603C.1	1	1	1	1	1	-	-	1	1	1	-	1	1	1	1
CO2	U18CN603C.2	2	2	2	2	2	-	-	1	1	1	-	1	1	1	1
CO3	U18CN603C.3	2	2	2	2	2	-	-	1	1	1	-	1	1	1	1
CO4	U18CN603C.4	2	2	2	2	2	-	-	1	1	1	-	1	1	1	1
U18CN603C		1.75	1.75	1.75	1.75	1.75	-	-	1	1	1	-	1	1	1	1

U18CN604R22 SOFTWARE ENGINEERING

Class: B. Tech. VI-Semester **Branch:** Computer Science and Engineering(Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: fundamental concepts of software and different types of software models

LO2: different types of design concepts and patterns

LO3: software design principles and test strategies

LO4: metrics for quality analysis of software and risk management

UNIT-I (9)

Software Engineering Concepts: The changing nature of software, Software application domains, Legacy software, Software myths, Software engineering layered technology, A process framework, The capability maturity model integration (*CMMI*), Agile software

Process Models -Prescriptive process models, RAD model, Specialized process models, Unified process model, Personal and team process models

Agile Development: Agility and the cost of change, Agile process, Extreme programming, Other agile process models

Software **Engineering Practices**: Communication principles, Planning principles, Modeling principles, Construction principles, Deployment principles

UNIT-II (9)

Requirements Engineering Tasks: Requirements analysis and modeling strategies, User requirement, System requirement, Software requirements document

Design Engineering: Design within the context of software engineering, Design process, Design concepts, The design model

Architectural Design: Software architecture, Architectural genres, Architectural styles, Architectural design, Assessing alternative architectural designs, Designing class based components, Conducting component level design, Design for WebApps, Designing traditional components

UNIT-III (9)

User Interface Design: The golden rules, User interface analysis and design, Interface analysis, Interface design steps, WebApp and mobile interface design

Testing Strategies: Software testing fundamentals, Test strategies for conventional software, Test strategies for object-oriented software, Validation testing, System testing, The art of Debugging, White box testing, Basis path testing, Control structure testing, Black box testing

Testing Web Applications: Testing concepts for webapps, The testing process, Content testing, User interface testing, Component-level testing, Navigation testing, Configuration testing, Security testing, Performance testing

UNIT-IV (9)

Product Metrics: Measures, Metrics and indicators, Metrics for the requirements model, Metrics for the design model, Metrics for source code, Metrics for testing, Metrics for maintenance
Process and Project Metrics: Metrics in the process and project domains, Software measurement, Metrics for software quality, Integrating metrics within the software process, The *W5HH* principle
Project Scheduling: Project scheduling, Scheduling for WebApps projects, Earned value analysis
Risk Management: Reactive versus Proactive risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM plan

Text Book:

[1] Roger S.Pressman and Bruce R.Maxim, *Software Engineering: A Practitioner's Approach,* 8th ed., NewDelhi: McGraw Hill, 2019

Reference Books:

[1]Ian Sommerville, *Software Engineering*, 10th ed., Delhi: Pearson Education, 2016
[2]Deepak Jain, *Software Engineering: Principles and Practices*, 3rd ed., Delhi: Oxford University Press, 2008
[3]Pankaj Jalote, *Software Engineering: A Precise Approach,* New Delhi: Wiley India, 2010
[4]Waman S. Jawadekar, *Software Engineering: A Primer*, New Delhi: Tata Mc graw Hill, 2008

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.
Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.
Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…
CO1: implement the appropriate software model for a given real time application
CO2: develop different types of software designs & patterns
CO3: apply an appropriate testing method for a given software
CO4: apply metrics to assess the quality of software and analyze the risk management in project scheduling

Course Articulation Matrix (CAM) U18CN604R22 SOFTWARE ENGINEERING																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN604R22.1	1	1	1	1	-	-	-	-	1	1	2	1	2	1	2
CO2	U18CN604R22.2	1	1	1	1	-	-	-	-	1	1	2	1	1	1	2
CO3	U18CN604R22.3	2	2	1	1	-	1	1	-	1	1	2	1	2	1	2
CO4	U18CN604R22.4	2	2	2	2	-	1	1	-	1	1	2	1	2	1	2
U18CN604R22		1.5	1.5	1.25	1.25	-	1	1	-	1	1	2	1	1.75	1	2

U18CN605 CLOUD COMPUTING

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: basic concepts of cloud and computing environments
LO2: cloud architecture and virtualization techniques
LO3: cloud platforms and real time applications used in industry
LO4: : importance of security and federated cloud

UNIT – I (9)

Principles of Parallel and Distributive Computing: Eras of computing, Parallel Vs Distributive computing, Elements of parallel computing, Elements of distributive computing, Technologies for distributive computing

Introduction: Cloud Computing at a glance, Historical developments, Building cloud computing Environment, Computing platforms and technologies

UNIT - II (9)

Cloud Computing Architecture: Introduction, Cloud reference model, Types of cloud, Economics of the cloud, Open challenges

Virtualization: Introductions, Characteristics of virtualized environments, Taxonomy of Virtualization techniques, Virtualization and Cloud computing, Pros and Cons of virtualization, Technology examples

UNIT - III (9)

Data Intensive Computing: Introduction, Data intensive computing, Technologies for data intensive computing

Cloud Platform in Industry: Amazon web services, Google app engine, Microsoft azure **Cloud Applications:** Scientific applications: ECG analysis in the cloud, Business and consumer applications: CRM and ERP

UNIT - IV (9)

Advanced Topics in Cloud Computing: Federated clouds/Inter Cloud Characterization and definition, Cloud federation stack, Aspects of interest, Technologies for cloud federation

Cloud Security: Security the top concern for cloud users, Cloud security risks, Privacy and privacy impact assessment, Trust, Cloud data encryption, Security of database services, Operating system security, Virtual machine security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management operating system, Mobile devices and cloud security

Text Book:

[1] Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, *Mastering Cloud Computing*, New Delhi: McGraw Hill, 2013 (reprint 2019) (chapters: 1 to 4 & 8 to 11)

[2] Dan C. Marnescu, *Cloud Computing Theory and Practice*, 2nd ed. Cambridge: Elsevier, 2018 (chapter: 11)

Reference Books:

[1] Dr. Kumar Saurabh, *Cloud Computing: Architecting Next-Gen Transformations Paradigms*, 4th ed. New Delhi: Wiley India Private Limited, 2018

[2] Barrie Sosinsky, *Cloud Computing Bible*, Indiana: Wiley Publications, 2011

[3] Anthony T.Velte, Toby J Velte and Robert Elsenpeter, *Cloud Computing*: *A practical Approach*,New York: McGraw Hill, 2010

Course Research Papers: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: design enterprise level applications in hosted cloud environments using Storage as a Service(STaaS)

CO2 analyze virtual environments for running applications using virtual machines

CO3: design service models using SaaS, PaaS, IaaS and apply cloud platforms, technologies and applications in industry using Microsoft Azure, Google AppEngine, Amazon web services

CO4: apply automate security and resources for applications using cloud computing tools to mitigate risk and providing sufficient foundation to enable further study and research

Course Articulation Matrix (CAM): U18CN605 CLOUD COMPUTING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN605.1	2	2	2	1	2	-	-	1	1	1	-	1	2	1	1
CO2	U18CN605.2	2	2	2	1	2	-	1	1	1	1	-	1	2	1	1
CO3	U18CN605.3	2	2	2	2	2	1	-	1	1	1	-	1	2	1	2
CO4	U18CN605.4	2	2	2	2	2	1	-	1	1	1	-	1	2	1	2
U18CN605		2	2	2	1.5	2	1	1	1	1	1	-	1	2	1	1.5

U18CN606R22 CRYPTOGRAPHY AND NETWORK SECURITY

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: basic concepts of security attacks, services, mechanisms and symmetric key cryptographic algorithms
LO2: number theory and public key cryptographic algorithms
LO3:hash techniques, message authentication techniques and key management & distribution
LO4: understand the concept of IP security, web security, firewalls and various malicious software

UNIT – I (9)

Overview: The OSI security architecture, Security attacks, Security services, Security mechanisms, A model for network security

Classical Encryption Techniques: Symmetric cipher model, Substitution techniques, Transposition techniques, Steganography

Block Ciphers and the Data Encryption Standard: Traditional block cipher structure, The data encryption standard, The strength of DES, Block cipher design principles, Block cipher operation

Advanced Encryption Standard: AES structure, AES transformation functions, AES key expansion

UNIT - II (9)

Number Theory: Prime numbers, Fermat's and Euler's theorems, Discrete algorithms

Public-Key Cryptography and RSA: Principles of public-key cryptosystems, The RSA algorithm

Other Public-Key Crypto systems: Diffie Hellman key exchange, Elliptic curve arithmetic, Elliptic curve cryptography

UNIT - III (9)

Cryptographic Hash functions: Applications of cryptographic hash functions, Two simple hash functions, Secure hash algorithm (SHA)

Message Authentication Codes: Message authentication requirements, Message authentication functions, Requirements for message authentication codes, Security of MACs, **HMAC Digital Signature and Authentication Protocols:** Digital signatures, Schnorr digital signature scheme ey Management and Distribution: Symmetric key distribution using symmetric encryption, Symmetric key distribution using a symmetric encryption, Distribution of public keys, X.509 certificates Electronic Mail Security: Pretty good privacy, S/MIME

UNIT - IV (9)

IP Security: IP security overview, IP security policy, Encapsulating security payload, Combining security associations

Transport-Level Security: Web security considerations, Secure sockets layer, Transport layer security

Malicious Software: Types of malicious software, Propagation-infected content-viruses, Virus counter measures

Firewalls: The need for firewalls, Firewall characteristics, Types of firewalls

Text Book:

[1] William Stallings, *Cryptography and Network Security: Principles and Practice,* 6th ed. Pearson Education,2014

Reference Books:

[1] Behrouz A. Forouzan and Deb deep Mukhopadhyay, *Cryptography and Network Security*, 2nd ed. New Delhi: McGraw Hill Education, 2010

[2] Atul Kahate, *Cryptography and Network Security*, New Delhi: MGHill Education, 2003

[3] D, *Cryptography and Data Security*, United Kingdom: Addison Wesley, 1982

[4] V.K.Iain, *Cryptography and Network Security*, New Delhi: Khanna Publishing House, 2013

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: design enterprise level applications in hosted cloud environments using Storage as a Service(STaaS)

CO2 analyze virtual environments for running applications using virtual machines

CO3: design service models using SaaS, PaaS, IaaS and apply cloud platforms, technologies and applications in industry using Microsoft Azure, Google AppEngine, Amazon web services

CO4: apply automate security and resources for applications using cloud computing tools to mitigate risk and providing sufficient foundation to enable further study and research

Course Articulation Matrix (CAM): U18CN606R22 CRYPTOGRAPHY AND NETWORK SECURITY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN606R22.1	3	2	2	1	2	-	-	1	1	1	-	1	2	1	2
CO2	U18CN606R22.2	3	2	2	1	2	-	1	1	1	1	-	1	2	2	1
CO3	U18CN606R22.3	3	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO4	U18CN606R22.4	3	2	2	2	2	1	-	1	1	1	-	1	2	2	2
U18CN606R22		3	2	2	1.5	2	1	1	1	1	1	-	1	2	1.75	1.75

U18CN607R22 CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: *the basic concepts of security mechanisms, building fundamental programs related to traditional techniques*

LO2: *designing programs effectively for symmetric and asymmetric algorithms*

LO3: *: implementing programs on management and exchange of keys*

LO4: *implementing ssl, port scan, network scan, IDS*

ist of Experiments

Experiments-I

1) Write a program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result

2) Write a program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result

Experiments-II

1) Write a program to implement Ceaser cipher algorithm

2) Write a program to implement Hill cipher

Experiments-III

1) Write a program to implement playfair cipher

2) Write a program to implement Verman cipher

Experiments-IV

1) Write a program to implement VignereCipher

Experiments-V

1) Write a program to implement one time pad

Experiments-VI

1) Write a program to implement DES algorithm

2) Write a program to implement the AES

Experiments-VII

1) Write a program to implement RSA

2) Write a program to implement Diffie - Hellman key exchange

Experiments-VIII

1) Write a program to implement SHA - 512

2) Introduction to cryptography software tool: CRYPTOOL

Experiments-IX

1) Implement and analyze DES using CRYPTOOL

2) Write a program to implement SSL connection

Experiments-X

1) Demonstrate IP address scanning in a network to identify active hosts, using GUI tool (Advanced IP Scanner)

2) Write a program to implement port scan of a device in a network and identify the open ports

3) Demonstrate software firewall rules to allow or block ports of a computer

Experiments-XI

1) Demonstrate the following using security scanner GUI tool (nmap or zenmap)

a. Find the active hosts in a network

b. Find the operating system version of a remote system

c. write complete details of a remote system

Experiments-XII

1) Demonstrate intrusion detection system (IDS) using a GUI tool (SNORT)

Laboratory Manual:

1. *Cryptography and Network Security Laboratory Manual,* Dept. of CSE (Networks), KITS Warangal.

Reference Book:

1. William Stallings, *Cryptography and Network Security: Principles and Practice*, 6th ed. Pearson Education,2014.

2. Menezes, P.C. van Oorschot, S.A. Vanstone: *Handbook of Applied Cryptography:* CRC Press, 1996

3. Abhijit Das and C.E.VeniMadhavan, *Public-key Cryptography: Theory and Practice*, Pearson, 2009

4. Darrel Hankerson, Alfred Menezes, Scott Vanstone, *Guide to Elliptic Curve Cryptography*, Springer-Verlag, 2004

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: analyze traditional algorithms

CO2 apply mathematical concepts required for various cryptographic algorithms

CO3: design and develop various security algorithms

CO4: analyze security aspects in networks using modern tools

Course Articulation Matrix (CAM):U18CN607R22 CRYPTOGRAPHYAND NETWORK SECURITY LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN607R22.1	2	2	2	2	2	-	-	1	1	1	1	1	2	2	2
CO2	U18CN607R22.2	2	2	2	2	2	-	-	1	1	1	1	1	2	2	2
CO3	U18CN607R22.3	2	2	2	2	2	-	-	1	2	1	1	1	2	2	2
CO4	U18CN607R22.4	2	2	2	2	2	-	-	1	1	1	1	1	2	2	2
U18CN607R22		2	2	2	2	2	-	-	1	1.25	1	1	1	2	2	2

U18CN608 CLOUD COMPUTING LABORATORY

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…
LO1: *installation and configuration of cloud*
LO2: *virtualization techniques*
LO3: *creating cloud based applications*
LO4 *securing applications in cloud*

List of Experiments

Experiments-I

1) Create a storage account and a hosted service component
2) Deploying an application using platform management portal

Experiments-II

1) Create a word document of your class time table and store on the cloud with docx and pdf format
2) Write a program to generate 'n' even numbers and deploy in cloud
3) Write a program to display n^{th} largest number from the given list and deploy in cloud

Experiments-III

1) Write a program to validate user, create a database login (username, password) and deploy in cloud
2) Write a program to validate user, create a database to store user info and deploy in cloud

Experiments-IV

1) Find procedure to run the virtual machine of different configuration, check how many virtual machines can be utilized at particular time

Experiments-V

1) Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine

Experiments-VI

1) Create your own Virtual Private Cloud (VPC)
2) Create public and private subnet

Experiments-VII

1) Create Pubic Routing Table, associate subnet and add routing rules
2) Create Private Routing Table, associate subnet and add routing rules

Experiments-VIII

1) Install a 'C' compiler in the virtual machine and execute sample programs

Experiments-IX

1) Show the virtual machine migration based on the certain condition from one node to the other

Experiments-X

1) Using Power Shell manage an application in cloud

Experiments-XI

1) Using Visual Studio deploy an application in cloud

Experiments-XII

1) Securing an application in cloud
2) Debugging an application in cloud

Laboratory Manual:

[1] *Cloud Computing Laboratory Manual,* Dept. of CSE (Networks), KITS Warangal.

Reference Books:

[1] Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, *Mastering Cloud Computing*, New Delhi: McGraw Hill, 2013 (reprint 2019).

[2] Dan C. Marnescu, *Cloud Computing Theory and Practice*, 2nd ed. Cambridge: Elsevier, 2018

[3] Dr. Kumar Saurabh, *Cloud Computing: Architecting Next-Gen Transformations Paradigms*, 4thed. New Delhi: Wiley India Private Limited, 2018

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: develop cloud applications and deploy using Storage as a Service (STaaS)
CO2 design applications on instantiated VMs of different configuration over different hypervisors
CO3: analyze the functioning of components in cloud platform, technologies and applications in industry
CO4: apply automate security policies for applications in cloud

Course Articulation Matrix (CAM):U18CN608 CLOUD COMPUTING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN608.1	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
CO2	U18CN608.2	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
CO3	U18CN608.3	2	2	2	2	2	-	-	1	2	1	1	1	2	1	2
CO4	U18CN608.4	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
U18CN608		2	2	2	2	2	-	-	1	1.25	1	1	1	2	1	2

U18CN609R22 ADVANCED JAVA PROGRAMMING LABORATORY

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: *developing GUI based programs using the concept of swings & JApplet*

LO2: *writing programs using JFrames*

LO3: *the concepts of generics and collections*

LO4: *sorting user-defined data using Comparable & Comparator interfaces and performing the unit testing with JUnit*

List of Experiments

Experiments-I

1) Write a java program to demonstrate the life cycle of JApplet

2) Write a JApplet program to display "Good Morning" if current time is between "6 AM and 12 PM" and "Good Afternoon" if the current time is between "12 PM and 6PM", and "Good Evening" if the current time is between "6PM and 12AM"

Experiments-II

1) Write a JApplet program which draws different geometric shapes and fill them with different colours

2) Write a JApplet program with 10 lines, with different sizes at different places

3) Write a JApplet program to display moving banner

Experiments-III

1) Write a JApplet program to demonstrate Mouse Events and KeyEvents

2) Write a JApplet program to demonstrate **MiniCalculator** with button events

Experiments-IV

1) Write a JFrame to demonstrate **MiniCalculator** with button events

2) Write a JFrame program from which you can open another frames with the help of button events

3) Design a registration form with the help of a JFrame

Experiments-V

1) Create a JFrame to add a menu bar with which we can change the background colour and draw different shapes like circle, oval, rectangle and square

2) Design different JFrames to demonstrate different layouts like Flow layout, Border layout, Grid layout and Null layout

Experiments-VI

1) Write a JFrame program to open and read text files and display them on the JTextArea

2) Write a JFrame program to work with window events

3) Write a JFrame program to insert, delete and update the records of a database table

Experiments-VII

1) Write a java program to demonstrate generic class

2) Write a java program to demonstrate methods and constructors in generics

3) Write a java program to demonstrate multiple type parameters in generic classes

4) Write a java program to demonstrate inheritances in generics

Experiments-VIII

1)) Write a java program to perform following operations on ArrayList, LinkedList, HashSet and LinkedHashSet

i) Insertion

ii) Deletion

iii) Traversing using traditional-for, for-each, Iterator and ListIterator

iv) Display the elements in reverse order

2) Write a program that will have a Vector which is capable of storing Employee objects. Use an Iterator and enumeration to list all the elements of the Vector

Experiments-IX

1) Write a java program to perform different operations on inbuilt Stack class

2) Write a java program to perform different operations on inbuilt Queue class

3) Write a java program to perform insertion, deletion, traversing and searching operations on HashMap and TreeMap

Experiments-X

1) Write a java program to store and retrieve user defined class objects from TreeSet

2) Write a java program to read a set of values and display the count of occurrences of each number using collection concept

Experiments-XI

1) Write a java program to display ArrayList values in sorted order

2) Write a java program to demonstrate Comparable interface for sorting user defined data type

3) Write a java program to demonstrate Comparator interface for sorting user defined data type

Experiments-XII

1) Write a java program to test simple arithmetic operations of Calculator class using JUnit concept

2) Write a java program to demonstrate different Assert methods and annotations

Laboratory Manual:

1. *Advanced Java Programming laboratory Manual,* Dept. of CSE (Networks), KITS Warangal.

Reference Book:

1. Herbert Schildt,JAVA The Complete Reference, 10th ed.New York: McGraw-Hill Education.
2. Sachin Malhotra, Saurabh Choudhary, Programming in JAVA, 2nd ed. New Delhi: Oxford University Press, 2013
3. UttamK.Roy, Advanced JAVA Programming, New Delhi: Oxford University Press, 2015
4. PualDeitel, Harvey Deitel, Java How to program, 10th ed. Chennai:Pearson Education, 2016
5. Sujoy Acharya, Mastering Unit Testing Using Mockito and JUnit, Birmingham: Packt Publishing Limited, 2014

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: design GUI programs by using the concept of swings & JApplet

CO2 create programs with the help of JFrames

CO3: apply the concept of generics & collections to work on dynamic data

CO4: demonstrate correct usage of Comparable & Comparator interfaces and examine the test cases to perform unit testing using the concept of JUnit

Course Articulation Matrix (CAM):U18CN609R22 ADVANCED JAVA PROGRAMMING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN609R22.1	2	2	2	1	2	-	-	-	2	1	-	2	3	1	3
CO2	U18CN609R22.2	2	2	2	1	2	-	-	-	2	1	-	2	3	1	3
CO3	U18CN609R22.3	2	2	2	1	1	-	-	-	2	1	-	2	3	1	2
CO4	U18CN609R22.4	2	2	2	1	2	-	-	-	2	1	-	2	3	3	3
U18CN609R22		2	2	2	1	1.75	-	-	-	2	1	-	2	3	2.5	2.75

U18CN610 MINI PROJECT

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: *implementing a project independently by applying knowledge to practice*

LO2: *literature review and well-documented report writing*

LO3*: creating PPTs and effective technical presentation skills*

LO4: *writing technical paper in scientific journal style & format and creating video pitch*

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student

Guidelines

1. The HoD shall constitute a *Department Mini Project Evaluation Committee (DMPEC)*
2. DMPEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation
3. There shall be only Continuous Internal Evaluation (CIE) for mini project
4. The CIE for seminar is as follows

Assessment	Weightage
Mini Project Supervisor Assessment	20%
Working model / process / software package / system developed	20%
Mini Project report	20%
Mini Project paper	10%
Video pitch	10%
DMPEC Assessment: *Oral presentation with PPT and viva-voce*	20%
Total Weightage:	100 %

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Mini Project Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Working Model**: Each student is requested to develop a working model / process / system

(c) on the chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*

(d) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by *DMPEC*

(e) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy ofthe institute

(f) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DMPEC* as per the schedule notified by the department

(g) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (*if any*) and social impact

(h) The student has to register for the Mini project as supplementary examination in the following cases:
   a. he/she is absent for oral presentation and viva-voce
   b. he/she fails to submit the report in prescribed format
   c. he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines

(i) The CoE shall send a list of students registered for supplementary to the HoD concerned, The DSEC, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list tothe CoE within the stipulated time

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: apply knowledge to practice to design & conduct experiments and utilize modern tools for developing working models / process / system leading to innovation & entrepreneurship

CO2 demonstrate the competencies to perform literature survey, identify gaps, analyze the problem and prepare a well-documented Mini project report

CO3: make an effective oral presentation through informative PPTs, showing knowledge on the subject & sensitivity towards social impact of the Mini project

CO4: write a "Mini project paper" in scientific journal style & format from the prepared Mini project report and create a video pitch on Mini project

Course Articulation Matrix (CAM):U18CN610 MINI PROJECT

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN610.1	1	1	2	2	1	1	1	2	2	2	1	2	2	2	2
CO2	U18CN610.2	1	1	-	2	-	-	-	2	2	2	-	2	2	2	2
CO3	U18CN610.3	-	-	-	-	-	-	1	2	2	2	-	2	2	2	2
CO4	U18CN610.4	-	-	-	-	-	-	-	2	2	2	-	2	2	2	2
U18CN610		1	1	2	2	1	1	1	2	2	2	1	2	2	2	2

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
VII-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[4Th+2P+1MP-I+Internship]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18MH701	Management Economics and Accountancy	3	_	_	3	10	30	40	60	100
2	PE	U18CN702	Professional Elective - III / MOOC-III	3	-	-	3	10	30	40	60	100
3	PE	U18CN703	Professional Elective - IV / MOOC-IV	3	-	-	3	10	30	40	60	100
4	PCC	U18CN704R22	Design and Analysis of Algorithms	3	-	-	3	10	30	40	60	100
5	PCC	U18CN705R22	Design and Analysis of Algorithms Laboratory	-	-	2	1	40	-	40	60	100
6	PCC	U18CM706R22	CASE Tools Laboratory	-	-	2	1	40	-	40	60	100
7	PROJ	U18CN707	Major Project - Phase – I	-	-	6	3	100	-	100	-	100
8	MC	U18CN708	Internship Evaluation	-	-	2	-	-	-	-	-	-
Total:				12	_	12	17	220	120	340	360	700
Additional Learning*: *Maximum credits allowed for Honours/Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for students opted for Honours/Minor students:				**-**	**-**	**-**	***17*+7**	**-**	**-**	**-**	**-**	**-**

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits]

Total Contact Periods/Week: 24 **Total Credits: 17**

Professional Elective-III / MOOC-III:	Professional Elective-IV / MOOC-IV:
U18CN702A: Block Chain Technologies	U18CN703A: Ethical Hacking
U18CN702B: Storage Area Networks	U18CN703B: Big Data Analytics
U18CN702C: High Speed Networks	U18CN703C: Web and Database Security
U18CN702M: MOOCs course	U18CN703M: MOOCs course

U18MH701 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…
LO1: *implementing a project independently by applying knowledge to practice*
LO2: *literature review and well-documented report writing*
LO3: *creating PPTs and effective technical presentation skills*
LO4: *writing technical paper in scientific journal style & format and creating video pitch*

UNIT-I(9)

Management: Meaning and definition, Scientific Management - Definition, Characteristics, Principles of management

Functions of Management: Planning - Definition, Characteristics; Organizing - Definition, Characteristics; Staffing- Meaning, Functions of personnel management; Directing- Leadership, Nature; Motivation—Nature, Types (financial, non-financial, intrinsic and extrinsic), Communication- Process, Types, Co-ordination- Definition, Steps to achieve effective coordination, Controlling- Definition, process (Chapters 1,3, 4, 5, 6, 7 of Part 4 of Text 1)

UNIT - II (9)

Economics: Meaning and definition, Scope, Micro and Macro Economics, Methods of Economics, Laws of Economics

Forms of Business Organization: Sole Proprietor ship, Partnership firm- Types of Partners, Cooperative society, Joint Stock Company- Features, Types, Merits and demerits (Chapters 1, 2, 3, 4 of Part 2 of Text 1)

UNIT - III (9)

Double Entry System and Book Keeping: Accounting concepts and conventions, Overview of accounting cycle, Journal- meaning, Journalizing, Ledger- Meaning, Ledger posting, Balancing; Cashbook (Single column), Preparation of Trial balance (Chapter 3, 4 of Text 2)

UNIT - IV (9)

Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments (Chapter5 of Text2)

Text Book:

[1] Y.K. Bhushan, Fundamentals of Business Organization and Management, 20th ed. New Delhi: Sultan Chand & Sons, 2017. (Units 1,2)

[2] T. S. Grewal, S.C. Gupta, Introduction to Accountancy, 8th ed. New Delhi: Sultan Chand & Sons, 2014. (Units 3, 4)

Reference Books:

[1] L. M. Prasad, Principles and Practice of Management, 9th ed. New Delhi: Sulthan Chand, 2016.

[2] R.L.Gupta & V.K.Gupta, Principles and Practice of Accountancy, 14th ed. New Delhi: Sulthan Chand

Course Learning Outcomes(COs):

On completion of this course, students will be able to...

CO1: comprehend the basic concepts of management
CO2: distinguish between micro &macro economics and forms of business organizations
CO3: pass journal entries & post the minto ledgers
CO4: prepare profit & loss accounts and assess the financial position through the balance sheet

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Webpage.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Articulation Matrix (CAM):U18MH701 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18MH701.1	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-
CO2	U18MH701.2	-	-	-	-	-	-	-	-	1	1	2	1	1	-	-
CO3	U18MH701.3	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-
CO4	U18MH701.4	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-
U18MH701		-								1	1	1.25	1	1		

U18CN702A BLOCKCHAIN TECHNOLOGIES

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: *basics of Blockchain, types of Blockchains & consensus algorithms*

LO2: *cryptographic primitives, Bitcoin Blockchain & alternative coins*

LO3: *ethereum ecosystem & development tools*

LO4: *architecture of Hyper ledger Fabric, Corda architecture & Alternative Blockchains*

UNIT-I (9)

Distributed systems:

The History of Blockchain and Bitcoin: Electronic cash, Blockchain, Generic elements of a Blockchain, Benefits and limitations of Blockchain, Tiers of blockchain technology, Features of a Blockchain

Types of blockchain: Distributed ledgers, Distributed Ledger Technology, Public Blockchains, Private Blockchains, Shared ledger, fully private and proprietary Blockchains, Tokenized blockchains, Token less Blockchains

Consensus: Consensus mechanism, Types of consensus mechanisms, Consensus in Blockchain

CAP theorem and Blockchain

UNIT - II (9)

Public Key Cryptography: Asymmetric cryptography

Public and private keys: RSA, Discrete logarithm problem in ECC, Hash functions, RSA digital signature algorithm, Elliptic curve digital signature algorithm

Introducing Bitcoin: Bitcoin, Digital keys and addresses, Transactions, Blockchain, Mining

Bitcoin Network and Payments: The Bitcoin network, Wallets, Bitcoin payments, Innovation in Bitcoin

Bitcoin Clients and APIs: Bitcoin installation

Alternative Coins: Theoretical Foundations, Bitcoin limitations, Litecoin, Zcash

UNIT - III (9)

Smart Contracts: History, Definition, Ricardian contracts

Ethereum: Introduction, Ethereum - bird's eye view, The Ethereum network, Components of the Ethereum ecosystem

Further Ethereum: Programming languages

Ethereum Development Environment: Test networks, setting up a private net, starting up the private network

Development Tools and Frameworks: Languages, Solidity language

Introducing Web3: Web3

UNIT - IV (9)

Hyper ledger: Projects under Hyper ledger, Hyper ledger as a protocol, The reference architecture, Fabric

Corda: Architecture, Components, The development environment – Corda

Alternative Blockchains: Ripple, Quorum, Multi chain, Rootstock, BigchainDB, Storj, Tezos

Current Landscape and What Next: Start-ups, Strong research interest, Real-world implementations, Education of blockchain technology Employment, Crypto economics, Research in cryptography, Interoperability efforts, Blockchain as a Service

Other challenges: Regulation, Dark side

Blockchain research: Smart contracts, Centralization issues, Limitations in cryptographic functions, Consensus algorithms, Scalability and Code obfuscation

Text Book:

[1] Imran Basir, *Mastering Blockchain*, 2nd ed., Packet Publishing Ltd., Birmingham – Mumbai, 2018. (*Chapters: 1,3,4,5,6,7,8,9,10,11,12,13)*

Reference Books:

[1] Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,*"Bitcoin and Crypto currency Technologies: A Comprehensive Introduction"*, Princeton University Press (July 19, 2016).

[2] Josh Thompson, *Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming,* Create Space Independent Publishing Platform, 2017.

[3] Andreas Antonopoulos, *Mastering Ethereum: Building Smart Contracts and Dapps*, O'REILLY 2018.

[4] Draft version of S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, *Blockchain Technology: Crypto currency and Applications*, Oxford University Press, 2019.

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(COs):

On completion of this course, students will be able to...

CO1: distinguish the type of blockchain and consensus algorithm
CO2: install Bitcoin client and apply the functionality of various alternative coins in bitcoin network
CO3: develop a smart contract using Ethereum development tools
CO4: compare Hyperledger Fabric and Corda block chain frameworks

Course Articulation Matrix (CAM):U18CN702A BLOCKCHAIN TECHNOLOGIES

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN702A.1	1	2	2	2	1	-	-	1	1	1	-	2	1	1	1
CO2	U18CN702A.2	3	3	2	2	1	-	-	1	1	1	-	2	1	2	1
CO3	U18CN702A.3	3	2	3	2	2	-	-	1	1	1	-	3	3	3	1
CO4	U18CN702A.4	1	2	3	2	1	-	-	1	1	1	-	3	1	2	1
U18CN702A		2	2.25	2.5	2	1.25			1	1	1	-	2.5	1.5	2	1

U18CN702B STORAGE AREA NETWORKS

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: *storage area networks characteristics and components*

LO2: *the importance of Fibre Channel protocols and how to communicate with each other*

LO3: *defining backup, recovery, disaster recovery, business continuity, and replication*

LO4: *identifying components of managing and monitoring the data centre*

UNIT-I (9)

Storage System: Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure.

Data Center Environment: Application, Host (Compute), Connectivity, Storage.

Data Protection: RAID: RAID Implementation Methods, RAID Techniques, RAID Levels, RAID Impact on Disk Performance.

Intelligent Storage Systems: Components of Intelligent Storage System, Storage Provisioning

UNIT - II (9)

Storage Networking Technologies

Fiber Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fibre Channel Architecture, Zoning, FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP, FCoE.

Network Attached Storage: Components of NAS, NAS I/O Operation, NAS File-Sharing Protocols, File-Level Virtualization

Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage, Unified Storage

UNIT - III (9)

Backup, Archive and Replication

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, BC Technology Solutions. Backup and Archive: Backup Methods, Backup Topologies, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive.

Local Replication: Replication Terminology, Uses of Local Replicas, Local Replication Technologies, Local Replication in a Virtualized Environment.

Remote Replication: Remote Replication Technologies, Three-Site Replication, Remote Replication and Migration in a Virtualized Environment

UNIT - IV (9)

Securing and Managing Storage Infrastructure

Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments.

Managing the Storage Infrastructure
Monitoring the Storage Infrastructure, Storage Infrastructure Management activities, Storage Infrastructure Management Challenges, Information Lifecycle management, Storage Tiering.

Text Book:

[1] Information Storage and Management, *Author: EMC Education Services,* Publisher: Wiley ISBN: 9781118094839

[2] Clark Tom, *Storage Virtualization,* Publisher: Addison Wesley publishing Company

Reference Books:

[1] Richard Barker, Paul Massiglia, *Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs*, Wiley India.
[2] Ulf Troppens, Wolfgang Muller-Friedt, Rainer Wolafka, *Storage Networks Explained*, Wiley Publication.
[3] G. Somasundaram, Alok Shrivastava, *Information Storage and Management*, EMC Education services, Wiley Publication.

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: understand the various storage architecture concepts.
CO2: apply Infrastructure of Storage network technologies and Virtualization Concept.
CO3: apply the backups, recovery, disaster recovery, business continuity and replications.
CO4: apply the storage infrastructure and management activities for real time environment.

Course Articulation Matrix (CAM):U18CN702B STORAGE AREA NETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN702B.1	1	2	2	2	1	-	-	1	1	1	-	2	1	1	3
CO2	U18CN702B.2	3	3	2	2	1	-	-	1	1	1	-	2	2	2	3
CO3	U18CN702B.3	2	3	3	3	2	-	-	1	1	1	-	3	2	3	3
CO4	U18CN702B.4	1	2	3	1	1	-	-	1	1	1	-	3	2	2	3
U18CN702B		1.75	2.5	2.5	2	1.25	-	-	1	1	1	-	2.5	1.75	2	3

U18CN702C HIGH SPEED NETWORKS

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…
LO1: *fundamental concepts, design and implementation of high speed networks*
LO2: *design and documentation of a high speed network*
LO3: *issues with high speed network design such as congestion control and traffic management*
LO4: *the features of different technologies involved in High Speed Networking and their performance*

UNIT-I (9)

Introduction: What is high speed network, the need for high speed network technologies, limitations of existing network architectures and protocols

High Speed Networks: Frame Relay Networks, Review on TCP/IP and ATM network basics, Asynchronous transfer mode, ATM Protocol Architecture, ATM logical Connection, ATM Cell, ATM Service Categories

High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fiber Channel, Wireless LAN's: applications, requirements, Architecture of 802.11

UNIT - II (9)

Queuing Theory: Introduction to Queuing Analysis, Queuing Models, and Single Server Queues.

Congestion and Traffic Management: Effects of Congestion, Congestion Control, Traffic Management, Congestion Control in Packet Switching Networks, Frame Relay Congestion Control

UNIT - III (9)

TCP and ATM Congestion Control: TCP Flow control, TCP Congestion Control Retransmission, Timer Management, Exponential RTO backoff, KARN's Algorithm, Window management, Performance of TCP over ATM. Traffic and Congestion control in ATM: Requirements, Attributes, Traffic Management Frame work, Traffic Control, ABR traffic Management, ABR rate control, RM cell formats, ABR Capacity allocations, GFR traffic management

UNIT - IV (9)

QoS in IP Networks:

Quality of service in IP networks, Integrated service architecture, queuing discipline, random early detection differentiated services protocol for QoS support, RSVP-Goals & Characteristics, Multiprotocol Label switching, Real-time Transport Protocol (RTP), IP version six.

Text Book:

[1] William Stallings, *High Speed Networks and Internets*, 2nd ed., Pearson Education (Prentice-Hall), 2004. *(Chapters 1, 2, 3, 5, 6, 7 and 8)*

Reference Books:

[1] J. Warland, V. Pravin, *High Performance Communication Networks*, Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
[2] I. Pepelnjk, J. Guichard and J. Apcar, *MPLS and VPN architecture*, Cisco Press, 2003

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: compare and analyse the fundamental principles of various high speed communication networks and their protocol architectures
CO2: identify and analyse the methods adopted for performance modeling of traffic flow
CO3: examine the congestion control issues and traffic management in TCP/IP and ATM networks
CO4: analyse and implement the various QoS standards of high speed networks.

Course Articulation Matrix (CAM):U18CN702C HIGH SPEED NETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN702C.1	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO2	U18CN702C.2	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO3	U18CN702C.3	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	U18CN702C.4	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18CN702C		2.75	2.75	2.75	2.75	1	-	-	1	1	1	-	2.5	1	1	1

U18CN703A ETHICAL HACKING

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…
LO1: *methodologies and framework of ethical hacking for enhancing the security*
LO2: *business perspective and planning for a controlled attack*
LO3: *reconnaissance, preparing for a hack, enumeration and exploitation*
LO4: *deliverable and integration*

UNIT-I (9)

Introduction: Hacking impacts, The Hacker-Type of hacker, Script kiddies
Framework: Planning the test, Sound operations, Reconnaissance, Enumeration, Vulnerability analysis, Exploitation, Final analysis, Deliverable, Integration
Information Security Models: Computer security, Network security, Service security, Application security, Security architecture
Information Security Program: The process of information security, Component parts of information security programs, Risk analysis and ethical hacking

UNIT - II (9)

The Business Perspective: Business objectives, Security policy, Previous test results, Business challenges
Planning for a Controlled Attack: Inherent limitations, imposed limitations, Timing is everything, Attack type, Source point, Required knowledge, Multi-phased attacks, Teaming and attack structure, Engagement planner, The right security consultant, The tester, logistics, Intermediates, Law enforcement

UNIT - III (9)

Reconnaissance: Social engineering, Physical security, Internet reconnaissance
Preparing for a Hack: Technical preparation, Managing the engagement
Enumeration: Enumeration techniques, Soft objective, looking around or attack, Elements of enumeration, Preparing for the next phase
Exploitation: Intuitive testing, Evasion, Threads and groups, Operating systems, Password crackers, Rootkits, Applications, War dialing, Network, Services and areas of concern

UNIT - IV (9)

Deliverable: The deliverable, The document, Overall structure, Aligning findings, Presentation
Integration: Integrating the results, Integration summary, Mitigation, Defense planning, Incident management, Security policy.

Text Book:

[1] James S. Tiller, *The Ethical Hack: A Framework for Business Value Penetration Testing*, New York: Auerbach Publications, CRC Press, 2005. *(Chapters2,3,4,5,6,7,8,9,10,12,13,14)*

[2] Patrick Engebreston, *The Basics of Hacking and Penetration testing*, 2nd ed. New York: Syngress Publishers, 2013. *(Chapters3,4,5,6,7,8)*

Reference Books:

[1] Michael Simpson, Kent Backman, James Corley, *Hands-On Ethical Hacking and Network Defense*, 2nd ed. New York: Cengage Learning, 2005.
[2] EC-Council, *Ethical Hacking and Countermeasures: Attack Phases,* New York: Course Technology Press, 2016
[3] Hein Smith, Hilary Morrison, *ETHICAL HACKING: A Comprehensive Beginner's Guide to Learn and Master Ethical Hacking,* New York: Kindle Edition, 2018

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: analyze security vulnerabilities and models to support ethical hacking
CO2: discuss on business requirements and testing plans for ensuring the privacy of the targeted company
CO3: apply tools and tactics to exploit a vulnerability and the effects it will have on the final deliverable
CO4: propose a roadmap for realizing all the potential value from the test performed

Course Articulation Matrix (CAM):U18CN703A ETHICAL HACKING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN703A.1	2	2	2	1	-	1	-	1	1	1	-	1	1	1	2
CO2	U18CN703A.2	2	2	2	2	-	1	-	1	1	1	-	1	1	1	2
CO3	U18CN703A.3	2	2	2	2	-	1	-	1	1	1	-	1	2	1	2
CO4	U18CN703A.4	2	2	2	3	-	1	-	1	1	1	-	1	2	1	2
U18CN703A		2	2	2	2	-	1	-	1	1	1	-	1	1.5	1	2

U18CN703B BIG DATA ANALYTICS

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop student's knowledge in/on…
LO1: *big data platform and its technologies*
LO2: *apache hadoop, map reduce and mongDB*
LO3: *cassandra and hive*
LO4: *pig and jasper reports*

UNIT-I (9)

Introduction to Digital & Big Data: Types of digital data, Classification of digital data, Characteristics of data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, 3Vs of Big Data, Non definitional traits of Big Data - Business intelligence vs. Big Data - Data warehouse and hadoop environment, Coexistence

Big Data Analytics: Classification of analytics, Data science, Terminologies in Big Data, CAP Theorem, BASE concept, Few top analytics tools

The Big Data Technology Landscape: NoSQL (Not Only SQL), Hadoop

UNIT - II (9)

Introduction to Hadoop: History of hadoop, Hadoop overview, RDBMS vs. hadoop, Distributed computing challenges, Use case of hadoop, Hadoop distributors, Hadoop distributed file system (HDFS), Processing data with hadoop, Managing resources and applications with hadoop YARN (Yet Another Resource Negotiator), Interacting with hadoop eco system
Map Reduce: Mapper, Reducer, Combiner, Partitioner, Searching, Sorting and Compression
Mongo DB: Terms used in RDBMS and mongoDB, Data types in mongoDB, mongoDB query language

UNIT - III (9)

Introduction to Cassandra: Features of cassandra, CQL data types, CQLSH, Keyspaces, CRUD (Create, Read, Update, and Delete) operations, Collections, Using a counter, Time to live (TTL), Alter commands, Import and export, Querying system tables
Introduction to Hive: Hive architecture, Hive data types, Hive file format, Hive query language (HQL), RCFile implementation, SerDe, User defined function (UDF)

UNIT - IV (9)

Introduction to Pig: Pig on hadoop, Use case for pig-ETL processing, Data types in pig, Running pig, Execution modes of pig, HDFS commands, Relational operators, Eval function, Complex data types, Piggy

bank, User defined functions (UDF), Parameter substitution, Diagnostic operator, Word count example using pig, Pig vs. hive

Introduction to Jasper Reports: Connecting to mongoDB NoSQL database, Connecting to cassandra NoSQL database

Case Study: Global innovation network and analysis (GINA).

Text Book:

[1] Seema Acharya and Subhashini Chellappan, *Big Data and Analytics*, 2nd ed., New Delhi: Wiley India Pvt. Ltd., 2019. *(chapters: 1,2,3,4,5,6,7,8,9,10, 11)*

Reference Books:

[1] *Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*, Indianapolis: EMC Education Services, 2015
[2] *DT Editorial Services*, *BIG DATA, Black Book*, New Delhi: DreamTech Press, 2016
[3] Russell Bradberry, Eric Blow, *Practical Cassandra A developers Approach*, Pearson Education, 2014
[4] Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, *Big Data for Dummies*, John Wiley & Sons, Inc., 2013.
[5] Kyle Banker, *Mongo DB in Action*, Manning Publications Company, 2012
[6] Tom White, *Hadoop: The Definitive Guide*, O'Reilly Publications, 2011

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: characterize digital with big-data and compare big data analytics tools
CO2: make use of open source hadoop technology, map-reduce framework, mongoDB for parallel processing applications
CO3: build structured database schema for distributed applications using cassandra and hive technologies
CO4: apply pig tool to process the large datasets and build application - oriented reports using JasperReports

Course Articulation Matrix (CAM):U18CN703B BIG DATA ANALYTICS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN703B.1	1	1	1	1	1	-	-	1	1	1	-	-	1	1	1
CO2	U18CN703B.2	2	2	2	1	1	-	-	1	1	1	-	1	2	1	2
CO3	U18CN703B.3	2	2	2	2	1	-	-	1	1	1	-	2	2	1	2
CO4	U18CN703B.4	2	2	2	2	2	-	-	1	1	1	-	2	2	2	2
U18CN703B		1.75	1.75	1.75	1.5	1.25	-	-	1	1	1	-	1.66	1.75	1.25	1.75

U18CN703C WEB AND DATABASE SECURITY

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…
LO1: *security aspects of web application and database systems*
LO2: *various types of attacks and risks to web applications and database*
LO3: *the security of databases and its design techniques*
LO4: *different models for the protection of new generation database systems*

UNIT-I (9)

Web Application Basics: Introduction, HTTP Protocol, Web Functionality, Encoding Schemes, Enumerating Content and Functionality, Analyzing the Application

Authentication Security: Authentication Techniques, Design Flaws in Authentication, Implementation Flaws in Authentication, Securing Authentication, Path Traversal Attacks

Injection Attacks: Injecting into Interpreted Contexts, SQL Injection, NoSQL Injection, XPath Injection, LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection

UNIT - II (9)

Cross Site Scripting (XSS): Types of XSS, XSS in real world, finding and exploiting XSS vulnerabilities, preventing XSS attacks

User Attacks: inducing user actions, capturing cross-domain data, client-side injection attacks, local privacy attacks, ActiveX control attacks, browser attacks

Vulnerability Analysis of Source Code: Approaches to Code Review, Signatures of Common Vulnerabilities, Analysis of Java platform, Analysis of ASP.NET platform, Analysis of PHP, Analysis of Perl, Analysis of Javascript, Analysis of SQL

UNIT - III (9)

Introduction: Introduction to Databases Security, Problems in Databases Security Controls Conclusions

Security Models -1: Introduction Access Matrix Model, Take-Grant Model, Acten Model, PN Model, Hartson and Hsiao's Model, Fernandez's Model, Bussolati and Martella's Model for Distributed databases

Security Models -2: Bell and LaPadula's Model, Biba's Model, Dion's Model, Sea View Model, Jajodia and Sandhu's Model, The Lattice Model for the Flow Control conclusion

UNIT - IV (9)

Models for the Protection of New Generation Database Systems -1: Introduction, a model for the protection of frame-based systems, a model for the protection of object-oriented systems, sorion model for the protection of object-oriented databases

Models for the Protection of New Generation Database Systems-2: A model for the protection of new generation database systems: the orion model ajodia and kogan's model, a model for the protection of active databases conclusions.

Text Book:

[1] Dafydd Stuttard, "*The Web Application Hacker's Handbook*", Wiley India Pvt. Ltd.(Chapters: 3,4,5,6,7,9,12,13)

[2] Castano, "*Database Security", Database Security and Auditing: Protecting Data Integrity and Accessibility*, Pearson Edition (lie), 1st Edition, Hassan Afyouni, THOMSON Edition. (Chapters: 1,2,3,4,5,6)

Reference Books:

[1] "*Database Security* " Alfred Basta, Melissa Zgola, Cengage Publication, 2012

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: compare and analyze the attacks in SQL, NoSQL, XPath, LDAP, XML and HTTP

CO2: examine the user attacks and vulnerabilities in real world scenario

CO3: apply various techniques to overcome security problems in distributed databases

CO4: make use of models for protecting the data in new generation database systems

Course Articulation Matrix (CAM):U18CN703C WEB AND DATABASE SECURITY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN703C.1	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO2	U18CN703C.2	2	2	2	2	1	-	-	1	1	1	-	2	1	1	1
CO3	U18CN703C.3	2	2	2	2	1	-	-	1	1	1	-	2	1	1	1
CO4	U18CN703C.4	2	2	2	2	1	-	-	1	1	1	-	2	1	1	1
U18CN703C		2	2	2	2	1	-	-	1	1	1	-	1.75	1	1	1

U18CN704 DESIGN AND ANALYSIS OF ALGORITHMS

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: *time and space complexity, asymptotic notations, set operations, problem solving with divide and conquer strategy*

LO2: *greedy and backtracking methods to solve computational problems*

LO3: *principle of optimality and problem solving with dynamic programming method*

LO4: *branch and bound method, classes of P,NP,NP-Hard and NP-Complete*

UNIT-I (9)

Introduction: Algorithm analysis, Performance analysis, Space complexity and time complexity, Big 'O' notation, Omega notation, Theta notation, Different mathematical approach's for solving time complexity of algorithms

Sets and Disjoint Set Union: Introduction, Union, Find operations

Divide and Conquer: General method, Binary search, Merge sort, Quick sort, Strassen's matrix multiplication

UNIT - II (9)

Greedy Method: General method, Knapsack problem, Job sequencing with deadlines, Optimal storage on tapes, Optimal merge patterns, Single source shortest paths

Back Tracking: General method, N-Queens problem, Sum of subsets, Graph coloring problem

UNIT - III (9)

Dynamic Programming: General method, Multistage graphs, All pairs shortest paths, Single source shortest paths, Optimal binary search trees, String editing, 0/1 Knapsack problem, Reliability design problem, Travelling sales person problem

UNIT - IV (9)

Branch and Bound: General method, Least cost (LC) search, The 15-puzzle problem, Control abstractions for LC search, 0/1 Knapsack problem, Travelling sales person problem

NP Hard and NP Complete Problems: Basic concepts - Nondeterministic algorithms, The classes NP hard and NP complete; COOK's theorem, NP hard graph problems - Clique decision problem, Node cover decision problem, Traveling sales person decision problem

Text Book:

[1] E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed. Hyderabad: Universities Press, 2018

Reference Books:

[1] Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Cliford Stein, *Introduction to Algorithms*, 3rd ed. New Delhi:Prentice-Hall of India, 2010

[2] Gajendra Sharma, *Design and Analysis of Algorithms*, 4th ed. Rajput: Khanna Publishing, 2019

[3] S.Sridhar, *Design and Analysis of Algorithms*,3rd ed. UK: Oxford University Press, India, 2015

[4] Mark Allen Weiss, *Data Structures and Algorithm Analysis in Java,* 3rd ed. New Delhi: Pearson, 2012

[5] Rajiv Chopra ,Shipra Raheja, *Design and Analysis of Algorithms*, New Delhi: New Age International Publishers,2019

Course Research Paper: Research paper(indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: apply divide and conquer strategy for searching and sorting techniques with performance

CO2: analyze algorithms using greedy and backtracking methods

CO3: design of algorithms using dynamic programming approach

CO4: analyze and categorize of problems for the classes P, NP ,NP-Hard and NP-Complete

Course Articulation Matrix (CAM):U18CN704 DESIGN AND ANALYSIS OF ALGORITHMS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN704.1	3	3	2	2	1	-	-	1	1	1	-	1	2	1	2
CO2	U18CN704.2	3	3	2	2	1	-	-	1	1	1	-	1	2	1	2
CO3	U18CN704.3	3	3	2	2	1	-	-	1	1	1	-	1	2	1	2
CO4	U18CN704.4	2	2	2	2	1	-	-	1	1	1	-	1	2	1	2
U18CN704		2.75	2.75	2	2	1	-	-	1	1	1	-	1	2	1	2

U18CN705 DESIGN AND ANALYSIS OF ALGORITHMS LAB

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…
LO1: *searching and sorting techniques using divide and conquer strategy*
LO2: *computational problems using greedy and backtracking methods*
LO3: *computational problems using dynamic programming technique*
LO4: *computational problems using branch and bound methods*

List of Experiments

Experiment-I (UNIT-I)

1) Program to implement binary search algorithm
2) Program to implement min-max algorithm

Experiment-II (UNIT-I)

1) Program to implement merge sort algorithm
2) Program to implement quick sort algorithm

Experiment-III (UNIT-I)

1) Apply strassen's matrix multiplication to multiply following matrix

A= **1 2** B= **2 1**

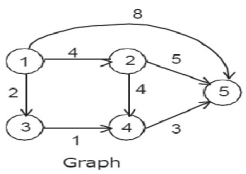
3 4 **4 3**

Experiment-IV (UNIT-II)

1) Program to implement 0/1 knapsack problem
2) Program to implement Job sequencing with deadlines

Experiments-V (UNIT-II)

1) Apply Dijkstras algorithm find the shortest path from 1 to each of the other five vertices in the graph



Graph

2) Program to implement N-Queens problem

Experiments-VI (UNIT-II)

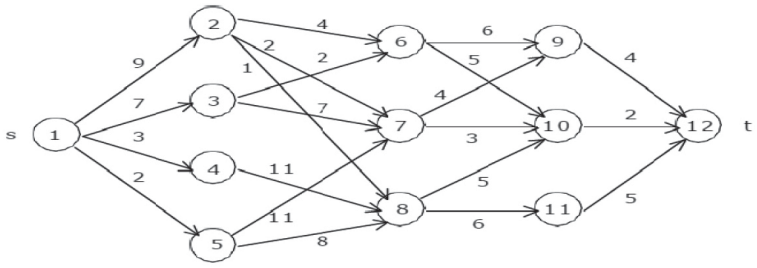
1) Program to implement sum of subsets

Experiment-VII (UNIT-III)

1) Implement bellman ford algorithm for Single source shortest paths

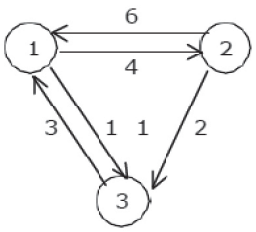
Experiment-VIII (UNIT-III)

1) Apply Multi stage graph algorithm and find shortest path



Experiment-IX (UNIT-III)

1) Apply All pairs shortest paths algorithm and find shortest path



Experiment-X (UNIT-III)

1) Program to implement Optimal binary search trees

Experiment-XI (UNIT-III)

1) Apply travelling sales person algorithm using dynamic programming and find shortest path

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0

Experiment-XII (UNIT-IV)

1) Apply travelling salesperson algorithm using branch and bound and find shortest path

$$\begin{pmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{pmatrix}$$

Laboratory Manual:

1. *Design and analysis of algorithms laboratory manual*,, Dept. of CSE (Networks), KITSW

Reference Book:

1. E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed, Universities Press, 2018.
2. Mark Allen Weiss, *Data Structures and Algorithm Analysis in Java,* 3rd ed, Pearson, 2012
3. Kathy Sierra, Bert Bates, *Head First Java8*, 2nd ed, O'Reilly Publications, 2020
4. Narasimha Karumanchi, *Data Structures and Algorithms Made Easy in Java,* careermonk, 2011
5. Uttam K. Roy, *Advanced JAVA Programming*, Oxford Publications, 2015

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: implement programs on binary search, min-max, merge sort, quick sort and strassen's matrix multiplication problems

CO2: develop knapsack, job sequencing with deadline, shortest path using greedy method, N-Queens and sum of subsets using backtracking method

CO3: implement programs on single source shortest path, multistage graph and all pairs shortest path using dynamic programming technique

CO4: implement programme for travelling sales person problem using branch and bound method

Course Articulation Matrix (CAM):U18CN705 DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CO1	U18CN705.1	3	3	2	2	1	-	-	-	1	-	-	1	2	1	2
CO2	U18CN705.2	3	3	3	2	1	-	-	-	1	-	-	1	2	1	2
CO3	U18CN705.3	3	3	3	2	1	-	-	-	1	-	-	1	2	1	2
CO4	U18CN705.4	2	2	2	2	1	-	-	-	1	-	-	1	2	1	2
U18CN705		2.75	2.75	2.5	2	1	-	-	-	1	-	-	1	2	1	2

U18CN706 CASE TOOLS LABORATORY

Class: B.Tech. VII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…
LO1: *computer aided software engineering tools*
LO2: *object-oriented analysis and design models using UML case tools*
LO3: *automated testing using Selenium Testing Tool*
LO4: *test Director for traceability and Test link an open source testing tool to manage tests*

List of Experiments

Experiment-I

1) Project scheduling using Microsoft project management tool
2) Project estimation using Microsoft project management tool

Experiment-II

Construct Use case and Class diagrams for the following

1) Online shopping
2) Banking system
3) Cab dispatching system

Experiment-III

Construct Collaboration and Sequence diagrams for the following

1) Librarian issues books to student
2) Mobile phone

Experiment-IV

Construct Activity and State chart diagrams for the following

1) ATM transaction
2) Ticket machine
3) Credit card processing

Experiment-V

1) Case study: Develop class diagram of Unified library application and model it in different views i.e. logic view, component view, deployment view, database design and perform forward & reverse Engineering

Experiment-VI

1) Manual testing: Take any system (e.g. ATM system) and study its system specifications and report the various bugs

Experiment-VII

1) Introduction to Selenium Testing Tool
2) Exploring Features of Selenium

Experiment-VIII

1) Test a web application using Selenium in NetBeans IDE

Experiment-IX

1) Working with Selenium Integrated Environment-Execution of IDE Commands
2) Selenium IDE locating strategies (validation of GUI components)

Experiment-X

1) Selenium IDE test case execution
2) Implement GUI tests (a web application's User Interface) using Selenium IDE

Experiment-XI

1) Study of any bug tracking tool (e.g. Bugzilla, Bug Bit)
2) Study of any test management tool (e.g. Test Director)

Experiment-XII

1) Study of any open source-testing tool (e.g. Test Link)
2) Take a mini project (e.g. University admission, Placement portal) and execute it, During the life cycle of the mini project create the various testing documents

Laboratory Manual:

1. *CASE Tools Laboratory Manual*, prepared by the faculty of Dept. of CSE (Networks), KITS Warangal.

Reference Book:

1. Meilir Page-Jones, *Fundamentals of Object Oriented Design in UML*, 1st ed. Noida: PearsonEducation, 2000.
2. Pascal Roques, *Modeling Software Systems Using UML2*, 1st ed., NewDelhi,wiley-Ind., 2009
3. Mark Priestley, *Practical Object-Oriented Design with UML*, 2nd ed., New Delhi: TATA McGraw Hill, 2009
4. Gandharba Swain, *Object Oriented Analysis & Design Through Unified Modeling Language*, 1st ed., New Delhi : Lakshmi Publications Pvt. Ltd, 2010
5. UmeshGundecha, *Selenium Testing Tools Cookbook*, 2nd Ed., Packt Publishing, ISBN: 978-178-439251-2, 20150

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: create schedule, cost estimation of the software project using Microsoft project management tool, and construct analysis model using unified modeling approach
CO2 design a software system using unified modeling approach
CO3: test with Selenium tool to improve the quality of the project/product being developed
CO4: apply Test director and Test Link testing tools for traceability and test managementt

Course Articulation Matrix (CAM):U18CN706 CASE TOOLS LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN706.1	2	2	2	2	-	-	-	1	1	1	1	2	2	1	2
CO2	U18CN706.2	2	2	2	2	2	-	-	1	1	1	1	2	2	2	2
CO3	U18CN706.3	2	1	2	2	2	-	-	1	1	1	1	2	2	1	2
CO4	U18CN706.4	1	2	2	2	2	-	-	1	1	1	1	2	2	2	2
U18CN706		1.75	1.75	2	2	2			1	1	1	1	2	2	1.5	2

U18CN707 MAJOR PROJECT WORK PHASE-I

Class: B.Tech. VII-Semester **Branch:** Computer Science & engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	6	3

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives(LOs):
The major project work will develop students' knowledge on /in …
LO1: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques
LO2: design/development of solutions to real-world engineering problems; conduct of investigations of complex problems; modern tool usage to design, build and test a prototype; impact of solution in society, environment and sustainability contexts
LO3: ethics, team work and project management skills such as budgeting, scheduling
LO4: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

1. *Final Year Major Project work represents the culmination of study towards the B. Tech degree.* ***Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems****. The* **student learning assessment process** *(SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project work*
2. Activities of major project SLAP shall be planned in such a way to ensure that the students acquire theessential knowledge, skills and qualities (KSQ) of a professional engineer
3. **Team work:** Major project work is a team work
   (i) The students of a project team shall work together to achieve a common objective
   (ii) Every student of a project team is expected to function effectively as an individual, and also with others as a team member in an ecosystem of team having knowledge diversity, gender diversity, social and cultural diversity among its members
4. **Two phases:** Major project work shall be carried out in two phases. Nearly 50 - 75% of the proposed work to be completed in 7th semester as *Phase-I* and the remaining work to be continued and completedin 8th semester as *Phase-II*
5. Every student is expected to put approximately **72 hours of work** into the major project *phase-I* course over the 12 weeks of 7th semester
6. **Major project work *Phase-I*: 7th semester**
   (i) The HoD shall constitute the ***department project evaluation committee (DPEC)*** with following composition

Department project evaluation committee (DPEC)	
HoD	Chairman
Senior Faculty	Convener
Coordinator(s)	Section - wise coordinator(s) *One coordinator for each section*
Three Faculty members	Section-wise faculty members *three faculty members for each section representing various socializations.* *(Five specializations will be covered including the coordinator's and Convener's)*

(ii) **Major project allotment to students during last working week of 6th semester**

(a) **First / Second week of 6th Semester**: The process shall be initiated during the first / second week of 6th semester by collecting project titles from the department faculty research groups, on offering innovative ideas/solutions for engineering problems

(b) **MSE-I period of 6th Semester – Notifying project titles**: The finalized project titles shall be notified to students during the MSE-I period of 6th semester and student teams shall be allowed to exercise their options on titles that interest them

(c) **Last working week of 6th Semester – Allotment of titles and supervisors to project teams**: The project title allotment to major project teams shall be completed before the last day of instruction of 6th semester

(d) **6th semester summer break - Literature review**: This 6th semester schedule enables students to complete literature review, preliminary simulations / investigations / experimentation during 6th semester summer break and *start the work from day-one in 7th semester*

(e) **Registration Presentation - Notifying the tentative dates:** The major project teams are expected to give registration presentation during second / third week from the commencement of 7th semester. The tentative dates for conducting the registration presentation shall be notified at the time of releasing the circular on allotted project title and project supervisors, as indicated in (c) above. This enables student teams to plan the work accordingly during summer break, to complete the literature review, preliminary simulations / investigations and get ready for informative, confident and comfortable presentations on their project work

(iii) The convener DPEC shall notify, during MSE-I period of 6th semester, the list of implementable project titles offered by the faculty of different research groups of the department

(a) Project titles shall come with the following details to be made available to students on dept webpage and notice boards, facilitating students to select problems that interest them

(i) abstract

(ii) deliverables / outcomes

(iii) knowledge and skills required to complete the project

(iv) resources required

(v) one of the deliverables shall be writing a technical paper out of the major project work done for submission to a reputed non-predatory conference/non-paid peer reviewedjournal

(iv) The major project teams, finalized by the convener DPEC, shall be allowed to exercise their options on the titles that interest them from the notified list

(v) **Project supervisor allotment**: The convener DPEC shall allot, during the last week of 6th semester, the faculty supervisors to all project teams

(a) The project supervisors shall

(i) define project objectives and expected deliverables

(ii) help the students plan their project work and timeline

(iii) provide enough resources for successful project completion

(vi) The faculty supervisors are expected to provide guidance to project teams on

(a) *Knowledge, skills and qualities (KSQ) to be acquired* to propose solutions to the identified real- world problems

(b) *Problem analysis* - to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

(c) *Applying engineering knowledge* - to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

(d) *Design/development of solutions* - to design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmentalConsiderations

(e) *Conduct investigations of complex problems* - to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

(f) *Modern tool usage* – to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

(g) *Engineering and society* – to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

(h) *Environment and sustainability* – to understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development

(i) *Ethics* – to apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice

(j) *Individual and team work* – to function effectively as an individual, and as a member or leaderin diverse teams, and in multidisciplinary settings

(k) *Communication* – to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

(l) *Project management and finance* – to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

(m) *Life-long learning* – to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

(vii) The project supervisors are also expected to continuously emphasize and guidestudents on

(a) **Meeting Cadence:**

  (i) **Regular meetings with supervisor:** Short and frequent meetings increase a team's workmomentum. Regular meetings with supervisor to review the status of project are very essential. All students of the team shall participate in discussions and take notes

  (ii) **Meeting Frequency: Semi-weekly cadence,** i.e., the meeting frequency shall be **twice a week.** Due weightage will be given to meeting cadence and considered for evaluation during presentations, i.e., number of planned meetings and number attended by students

(b) **Project Log Book:** The activity journaling in project log book is very important for a successful project. Project log book is a written record showing the daily project activity on project goals from the very first thing like starting the project (an introduction statement what the project is all about), to the completion of the work (including the final results, and whether project met the core objectives / outcomes, etc.)

(i) In project log book, the activities like regular meetings with project supervisor, and work carried out on daily/weekly basis are to be recorded. This ensures that the student progress is being monitored well

(ii) The project supervisor shall regularly check the log book of every student of project team and endorse each and every activity by affixing his signature with date. With this, the number of planned meetings and number attended by the students will bealso monitored

(iii) Log books are to be shown during all presentations and will be graded along with the project

(iv) At the conclusion of the project work *phase-I*, the supervisor shall specifically comment, in the project log book, on whether the project team met each of the project work *phase-I* goals and to give evidence which describes the quality of work. For project teams, this also serves as self-assessment

(c) **Following project timeline**: completing the tasks as planned in project timeline

(d) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(e) **Writing down whatever is done and making notes of whatever is read**. Writing down the procedures/models followed, designs made, experiments conducted, simulations carried out, intermediate results obtained, ***difficulties faced and how they were fixed*** are very important. This kind of documenting the whole process as we go with project implementation is a very effective way and will help preparing a well-documented report having original content. Note down and include information about all the resources that you used, magazines, Journals, patents, books, and so on. **This information will be needed for the bibliography in your project report. On the other hand, documenting a report *on the spur of the moment* would end up copying things from other sources resulting in a plagiarized document**

(f) **Good and sufficient literature review**: Literature review is a description and analysis of information related to the topic of project work. Reading good number of review articles, research articles published in recent issues of peer reviewed journals, technical magazines, patents, reference books on the topics of potential interest, will help one understand what has already been discovered and what questions remain to identify gaps in the literature

(g) Completing nearly 50 - 75% of the proposed work during phase-I

(h) Right conduct of research to promote academic integrity, honesty and time management

(i) Preparing a well-documented report in proper format, covering the progress madeduring Phase-I

(j) Consequences of plagiarism and use of anti-plagiarism software to detect plagiarism in documents

(k) Submission of major project phase-I report within acceptable plagiarism levels, as per the Anti-plagiarism policy-2020 of our institute

(l) **Video pitch:** Capturing short videos, photos, screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package/system developed during course of project execution, photos showing interaction withsupervisor for creating a short video pitch on the work done during *phase-I*

(m) **Project Paper**: Writing a technical paper at the end of *phase-II* based on the solution(s) proposed, results obtained and prototype / working model /

process / software package / system developed, for submission to a reputed non-predatoryconference/non-paid peer reviewed journal

(n) **Project poster**: At the end of phase-II, the project teams shall have to present their project in the form of posters, at the time of demonstration of complete porotype /working model / software package / system developed

(viii) **Phase – I evaluation**: There shall be only Continuous Internal Evaluation (CIE) for majorproject work *phase-I* with following components

(a) **Registration Presentation** *(during second / third week of 7th semester):* The Registration Presentation shall include a brief report and presentation focusing the identified problem, objective(s), literature review, identifying research gap in the literature, implementation of existing methods, proposed solution, and expected outcome(s)

(i) The registration presentation shall invariably include the **project plan timeline** with actual start and finish dates– monthly/weekly project milestones/ timeline prepared in MS Excel or any other project management tool

(ii) **Project timeline** – *Weekly project milestones*: It's a compact and creative way to present a project plan. Identify the project intermediate goals and related tasks for completing each of those goals. Categorize tasks for each week. In the project timeline use different colors to the tasks for each week. Horizontal timeline layouts shall be preferred or any other layout of team's choice

(iii) Project teams shall create and present the following during registration presentation

1. *Complete project timeline*
2. *Phase-I project timeline*
3. *Phase-II project timeline*

(iv) During every presentation, project teams shall compulsorily show the following aspart of their presentation

1. *The slides on project timeline and*
2. *A table showing targeted tasks as per timeline and status – whether tasks accomplished?*

(v) **Project log book**: Every student of the Project team shall compulsorily show theactivity journaling in the log book (*with due signatures of project supervisor*) during presentations

(b) **Progress Presentation-I** *(during penultimate week of 7th semester):* At the end of first stage (7th semester), student teams shall be required present, before the DPEC, the progress made during phase-I and submit a well-documented report of work done for evaluation to the project coordinator

(i) **Following project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline

(ii) Project teams shall compulsorily show the following as part of their progresspresentation-I

1. *The slides on project timeline and*
2. *A table showing targeted tasks as per timeline and whether tasks accomplished?*

(iii) **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (*with due signatures of project supervisor*)

(ix) **CIE schedule**: The convener DPEC shall release complete schedule of CIE before start of 7th semester well in advance, so that student teams will complete the scheduled

works and get ready with informative, confident and comfortable presentation for registration and progress presentations

(x) CIE for the Major project work phase-I shall be as given below:

Major project work Phase-I Assessment *(7^{th} semester)*	**Weightage**
A. Supervisor Assessment	**20%**
B. DPEC Assessment *(i) Registration Presentation (10%)* *(ii) Progress Presentation-I (20%)* *(iii) Project progress*: Part of working model/ process/software package/system developed (30%)* *(iii) Well-documented Progress Report on Phase-I work (10%)* *(iv) Video pitch on Phase-I (10%)*	**80%**
Total Weightage	**100 %**

** Students are advised to complete major part of the project in phase-I only*

(xi) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The progress made in this shall be demonstrated during progress presentation-I at the end of *phase-I* and the completed working model/ process/software package/system before the DPEC as per the dates specified by DPEC atthe end of *phase-II*

(xii) **Progress Report on *phase-I*:** Every project team shall be required to submit a well-documentedprogress report on dissertation phase-I as per format specified by DPEC

- Tangible outcomes of *phase-I* in Conclusions - Chapter: These are the lessons learnt from doing a project work. The students have to describe in their own words what they learnt from the *phase-I* project work experience. They have to describe what specific KSQs are acquired by them, with reference to the expected COs, after successful completion of *phase- I* work. Finally, a table depicting systematic mapping of what they have learnt and the expected major project work COs, is to be presented in the conclusions chapter of *phase-I*report

(xiii) **Video pitch on *phase-I*:** Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I*. The project team shall present the produced video pitch during progress presentation-I. The produced video pitch should

(a) be 3 to 5-minute-long video (no longer than 5 minutes)
(b) be concise and to the point, on the problem and proposed solution
(c) show project timeline and sample page of log book
(d) highlight the progress made at various stages during *phase-I* project implementation with the help of short videos / photos / screenshots on experiments conducted, simulations carried out, part of prototype / working model / process / software package / system being under development as part of proposed solution and also photos showing team interactions with supervisor and the team working in the lab on project
(e) discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts*
(f) emphasize key points about *business idea, potential market for the proposed solution*

(xiv) It is mandatory for

(a) every student of the team to *appear for oral presentation and viva-voce*, as part of progresspresentation -I to qualify for course evaluation
(b) every project team *to submit a well-documented progress report on major project work phase-I*, as part of progress presentation -I to qualify for course evaluation
(c) every project team to create and present a good video pitch on major project work *phase-I*, as part of progress presentation -I to qualify for course evaluation

(xv) A student shall register for supplementary examination for the Major project work *phase-I* in the following cases

(a) He/she is absent for oral presentation and viva-voce as part of progress presentation-I

(b) The project team fails to submit the progress report on *phase-I* in prescribed format

(c) The project team fails to submit the video pitch on the progress made during the *phase-I* period

(d) he/she fails to fulfill the requirements of Major project work *phase-I* evaluation as perspecified guidelines

7. Supplementary examination for Major project work *phase-I*

(i) The CoE shall send the list of students, registered for supplementary examination, to the HoDsconcerned

(ii) The DPEC, duly constituted by the HoD, shall conduct Major project phase-I supplementary examand send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

Upon completion of major project work, students will be able to…

*CO1: review research literature, identify gaps in the literature, formulate problem, apply knowledge of mathematics, sciences, engineering fundamentals, experimental and data analysis techniques; synthesize technical knowledge and innovative approaches to generate suitable solutions for real- world complex engineering problems (**Technical skills**)*

*CO2: design a system or product based on product/customer specifications; develop, analyze, and critically evaluate the design alternatives in order to justify the solutions to a real-world problem guided by ethical, environmental, societal and sustainable development considerations; use modern engineering and IT tools to design, build and test a prototype within specified project timeline and budget (**Problem solving and critical thinking skills**)*

*CO3: apply project management and organizational skills; demonstrate integrity, leadership, creativity, professional and ethical responsibilities as an individual and as a member or leader to produce time-sensitive deliverables in a multi-disciplinary team (**Ethics and teamwork**)*

*CO4: collate the results, compare performance of prototype to design specifications and present clearly and effectively the proposed solution, conclusions and/or recommendations in written (report, poster, technical paper), oral (presentations) and multimedia formats (video pitch) and engage in self-directed independent learning and life-long learning demonstrating the KSQ of a professional engineer (**Communication skills and life-long learning**)*

Course Articulation Matrix (CAM):U18CN707 MAJOR PROJECT WORK PHASE-I

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN707.1	2	2	2	2	-	-	-	3	-	2	-	3	3	3	3
CO2	U18CN707.2	2	2	2	-	2	2	2	3	-	-	-	3	3	3	3
CO3	U18CN707.3	-	-	-	-	-	-	-	3	2	-	2	3	3	3	3
CO4	U18 CN707.4	-	-	2	2	2	2	2	3	-	2	-	3	3	3	3
U18CN707		2	2	2	2	2	2	2	3	1	2	2	3	3	3	3

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING(NETWORKS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTION & EVALUATION *(Applicable from B21 batch)*
VIII-SEMESTER OF 4-YEAR B. TECH DEGREE PROGRAM

[3Th+1MP-II]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	PE	U18CN801	Professional Elective - V / MOOC-V	3	-	-	3	10	30	40	60	100
2	PE	U18CN802	Professional Elective - VI / MOOC-VI	3	-	-	3	10	30	40	60	100
3	OE	U18OE803	Open Elective - IV / MOOC-VII	3	-	-	3	10	30	40	60	100
4	PROJ	U18CN804	Major Project - Phase – II	-	-	14	7	60	-	60	40	100
5	PCC	U18CN805R22	Mobile Application Development Laboratory	-	-	-	-	-	-	-	-	-
			Total	9	-	14	16	90	90	180	220	400
Additional Learning: Maximum credits allowed for Honours/Minor in Engineering*				-	-	-	*7*	-	-	-	-	-
Total credits for students opted for Honours/Minor students:				**-**	**-**	**-**	***16+7***	**-**	**-**	**-**	**-**	**-**

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 23** **Total Credits: 16**

Professional Elective-V / MOOC-V:	Professional Elective-VI/ MOOC-VI:	Open Elective-IV/MOOC-VII:
U18CN801A: Software Defined Networking U18CN801B: Cyber Security and Digital Forensic U18CN801C: Advanced Real World Data Networks U18CN801M: MOOCs course	U18CN802A: Network Automation U18CN802B: Data Science U18CN802C: Fog and Edge Computing U18CN802M: MOOCs course	U18OE803A: Operations Research U18OE803B: Management Information Systems U18OE803C: Entrepreneurship Development U18OE803D: Forex &Foreign Trade U18OE803M: MOOCs Course

Note: An Android course with at least 2 weeks duration must be done by students and should submit course completion certificate

U18CN801A SOFTWARE DEFINED NETWORKING

Class: B.Tech. VIII – Semester **Branch**: Computer Science and Engineering (Networks)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs) :
This course will develop students' knowledge in/on
LO1: concepts of software defined networks
LO2: interface between networking devices and the software controlling them
LO3: SDN in data centers and how to use SDN
LO4: explore modern approaches like openflow, openstack

UNIT - I (9)

SDN Introduction: Basic packet-switching terminology, Historical background, The modern data center, Traditional switch architecture, Autonomous and dynamic forwarding tables, Open source and technological shifts

Why SDN: Evolution of switches, Control plane, Cost, SDN implications for research and innovation, Data center innovation, Data center needs

The evolution of networking technology, Forerunners of SDN, Sustaining SDN interoperability, Open source contributions, Legacy mechanisms evolve towards SDN network virtualization

UNIT - II (9)

SDN and Open Flow Specification: Fundamental characteristics of SDN, SDN operation, SDN devices, SDN controller, SDN applications, Alternate SDN methods

Open Flow Specification: OpenFlow overview, OpenFlow 1.0, OpenFlow basics, OpenFlow 1.1 additions, OpenFlow 1.2 additions, OpenFlow 1.3 additions, OpenFlow limitations

UNIT - III (9)

SDN in data center and other environment: Data center definition, Data center demands, Tunnelling technologies for the data center, Path technologies in the data center, Ethernet fabrics in the data center, SDN use cases in the data center, Open SDN vs Overlays in the data center, Real world data center implementations

SDN in other environments: SDN in other environments, Wide area networks, Service provider and carrier networks, Campus networks, Hospitality networks, Mobile network, In-Line network functions Optical networks, SDN vs P2P/Overlay networks

UNIT - IV (9)

SDN Applications: Reactive versus proactive applications, Analyzing simple SDN applications, A simple reactive Java application, Background on controllers,Using the floodlight controller, Using the open daylight controller, Using the CISCO XNC controller, Switch considerations, Creating network virtualization tunnels, Offloading flows in the data center, Access control for the campus traffic engineering for service providers

Open source perspectives: Open source licensing issues, Profiles of SDN open source users, OpenFlow source code, Switch implementations, Controller implementations, SDN

applications, Orchestration and network virtualization, Simulation and testing, Tools openStack

Text Book:

[1] Paul Goransson and Chuck Black, *Software Defined Networks: A Comprehensive Approach*, Morgan Kaufmann Publications, 1st Ed., 2014. *(Chapters 1, 2, 3, 4, 5, 7, 8, 10, 11)*.

Reference Books:

[1] Thomas D. Nadeau and Ken Gray, *SDN - Software Defined Networks* O'Reilly Media, 2013.
[2] SiamakAzodolmolky, *Software Defined Networking with OpenFlow*, Packt Publishing, 2013.
[3] Vivek Tiwari, *SDN and Open Flow for Beginners*, Amazon Digital Services, Inc., 2013
[4] Fei Hu, Editor,*Network Innovation through Open Flow and SDN: Principles and Design*, CRC Press, 2014

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.
Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.
Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, student's will be able to…
CO1: apply the concepts into a network to differentiate between traditional networks and software defined networks
CO2: identify and understand advanced, emerging networking technologies
CO3: apply how to use SDN controllers to perform complex networking tasks using SDN data centers
CO4: discover the skills to do advanced networking research and programming

Course Articulation Matrix (CAM): U18CN801A SOFTWARE DEFINED NETWORKING															
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
U18CN801A.1	2	-	-	1	-	-	-	1	1	1	-	2	1	2	-
U18CN801A .2	2	2	2	-	-	-	1	1	1	1	-	3	2	2	-
U18CN801A .3	2	2	2	1	2	-	-	1	1	1	-	2	1	2	-
U18CN801A .4	2	2	2	2	2	2	2	1	1	1	-	2	2	2	-
U18CN801A	2	2	2	1.3	2	2	1.5	1	1	1	-	2.25	1.5	2	-

U18CN801B CYBER SECURITY AND DIGITAL FORENSICS

Class: B.Tech. VIII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):
This course will develop student's knowledge in/on…
LO1: cyber crimes and planning of cyber offenses in the society
LO2: cybercrimes in mobile and wireless devices
LO3: cyber security and cyber laws to control cybercrime
LO4: digital forensics and digital evidences

UNIT – I (9)

Introduction to Cyber-crime: Introduction, cyber-crime and information security, who are cyber criminals, classifications of cyber-crimes, cyber-crime - the legal perspectives and Indian perspective, cyber-crime and the Indian ita 2000, a global perspective on cyber-crimes.
Cyber offenses: How criminals plan them: introduction, how criminals plan the attacks, social engineering, cybers talking, cyber cafe and cyber-crimes, botnets: the fuel for cybercrime, attack vector, cloud computing.
Case Study: A comprehensive digital forensic case study on mirai botnet servers

UNIT - II (9)

Cyber-crime: Mobile and Wireless Devices: Introduction, proliferation of mobile and wireless devices, trends in mobility, credit card frauds in mobile and wireless computing era, security challenges posed by mobile devices, registry settings for mobile devices, authentication service security.
Attacks on Mobile/Cell Phones, Mobile Devices: security implications for organizations, organizational measures for handling mobile, organizational security policies and measures in mobile computing era, laptops.
Case Study: A case study on the mobile malware: Cabassous / Flubot

UNIT - III (9)

Cyber-crimes and Cyber security: The legal perspectives - introduction, cyber-crime and legal landscape around the world.
Need of Cyber laws: The Indian context, the Indian it acts, challenges to Indian law and cyber-crime scenario in India, digital signatures and the Indian it acts, amendments to the Indian it acts, cyber-crime and punishment, cyber law, technology and students: Indian scenario.
Case Study: conviction of PARK JIN HYOK held in brambul worm attack

UNIT - IV (9)

Introduction to digital forensics and digital evidences: introduction to digital forensic, need of digital forensic, rules of computer/digital forensic, types of digital forensics, ethical issues, digital forensic investigations, introduction to digital evidences, rules of digital evidence, characteristics of digital evidence, types of evidence, challenges in evidence handling.
Case Study:post-retrieval search hit clustering to improve information retrieval effectiveness

Text Book(s):

[1] Nina Godbole, Sunil Belapure, *Cyber Security: Understanding Cyber Crimes, Compute Forensics and Legal Perspectives*, New Delhi: Wiley India Pvt. Ltd., 2011 *(chapter 1,2,3,4,5,6,7)*

[2] Dr. Nilakshi Jain and Dr. Dhananjay R. Kalbande, *Digital Forensic,* New Delhi:Wiley, India Pvt. Ltd., 2018 *(chapter 8,9,10)*.

Reference Books:

[1] James Graham, Richard Howard and Ryan Otson, *Cyber Security Essentials*, New York: CRCPress T & FGroup, 2011

[2] Chwan-Hwa (john) Wu, J. David Irwin, *Introduction to Cyber Security*, New York: CRC Press T& F Group, 2013

[3] Thomas A Johnson, *Cyber Security Protecting Critical Infrastructures from Cyber Attack and Cyber Warfare*, Missouri: CRC Press T & F Group, 2015

[4] Nilakshi Jain and Ramesh Menon, *Cyber Security and Cyber Laws,* New Delhi: Wiley India Pvt.Ltd., 2020

[5] Darren R.Hayes, *Practical Guide to Digital Forensics Investigations,* New York: Pearson It Cybersecurity Curriculum,2021

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: analyze the concepts of cybercrimes and identify the plans in committing cyber offenses

CO2: analyze vulnerabilities in mobile and wireless devices

CO3: apply the Indian IT Act and cyber law

CO4: apply the digital forensic techniques and digital evidence to trace the causes for the crime happened

Course Articulation Matrix (CAM):U18CN801B CYBER SECURITY AND DIGITAL FORENSICS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN801B.1	1	2	1	2	1	-	-	1	1	1	-	1	1	2	1
CO2	U18CN801B.2	2	3	2	2	2	-	-	1	1	1	-	1	2	2	1
CO3	U18CN801B.3	2	2	2	2	1	-	-	1	1	1	-	1	1	2	1
CO4	U18CN801B.4	2	2	1	3	2	-	-	1	1	1	-	1	2	2	1
U18CN801B		1.75	2.25	1.5	2.25	1.5	-	-	1	1	1	-	1	1.5	2	1

U18CN801C ADVANCED REAL WORLD DATA NETWORKS

Class: B.Tech. VIII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on…

LO1: building upon an understanding of networking principles
LO2: explores the design and implementation of the Ethernet network architecture
LO3: generations of Mobile Wireless Technology
LO4: generations of Mobile Wireless Technology

UNIT – I (9)

Networking Review: Data Center Fabric, Routers, Routing,introducing data center fabric **the next-generation Facebook data center network:** Moving fast, @scale, the limits of clusters, Introducing the fabric, Network technology, Gradual scalability, Physical infrastructure**,**
Automation, Transparent transition, Port Land: a scalable fault-tolerant layer 2 data center network fabric, Improving datacenter performance and robustness with multipath TCP,An enhanced socket API for Multipath TCP

UNIT - II (9)

Ethernet over Copper Wire:
Evolution of Ethernet Standards in IEEE802.3 Working Group: Introduction,Evolution of Ethernet Standards
Ethernet Technologies: Ethernet Network Elements, Ethernet Network Topologies and Structures, The Ethernet MAC Sublayer, The Ethernet Physical Layers, Network Cabling-Link Crossover Requirements.
Switch Internals: Architecture of Internet Switches and Routers, High-performance Packet Switching Architectures.
Fiber Optics: The Fiber Optic Association Guide, Optical amplifier

UNIT - III (9)

Satellite Communication: History, Satellite orbits, Structure, Frequency allocation for satellite systems, Applications, Iridium satellite constellation, An Operational and Performance Overview of the Iridium Low Earth Orbit Satellite System, IEEE Communications Surveys.

Legacy Mobile Networking:
Generations of Mobile Wireless Technology: A Survey, Evolution of Mobile Communication Network: from 1G to 5G.

OFDM: A Beginner's Guide to OFDM, A Wireless Channel, Digital Modulation, A Low Data Rate Signal, Moving towards High Data Rate, Solution – Equalizer, OFDM in Time Domain, OFDM in Frequency Domain, Adaptive Equalization Algorithms: An Overview

UNIT - IV (9)

The Foundations of Zigbee: IEEE 802.15.4 Standard: a tutorial/primer, electronics notes,Zigbee AODV protocol basics, RF Wireless World, The Zigbee Protocol (Netguru),Zigbee networks, Zigbee Fundamentals.

Local Interconnect Network (LIN): LIN Protocol (Wikipedia), LIN Bus Explained - A Simple Intro (CSS Electronics), LIN (Local Interconnect Network) Solutions, AN1278, STMicroelectronics

Online Resources:

[1] *Website: Course schedule, materials, announcements, etc, http://www.andrew.cmu.edu/course/ 14-760- s19/*

[2] *Canvas: Used for turning in work, https://www.cmu.edu/canvas/*

[3] *Piazza: Used for discussion among fellow students, https://piazza.com/class/jqxth6febqf5y4*

Reference Books:

[1] *Kipp, Storage growth and Ethernet," [Online], http://www.ieee802.org/3/ad_hoc/bwa/public/sep11/kipp_01a_0911.pdf*

[2] *Kramer,* Ethernet Passive Optical Networks. *New York: McGraw-Hill Professional, Mar, 2005*

[3] *Hajduczenia and H. J. A. da Silva, "Next generation Ethernet passive optical networks: 10G-EPON,"in* Wireless Edge, Optical Core – Next Generation Networks*, K. Iniewski, Ed. New York: JohnWiley & Sons, 2010*

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: understand the various data center network concepts

CO2: apply Ethernet Technologies in Legacy Mobile Networking for Satellite Communication

CO3: apply and Examine Generations of 5G infrastructure in Mobile Wireless Technology

CO4: apply advanced network programming for developing network and network management services in real time applications

Course Articulation Matrix (CAM):U18CN801C ADVANCED REAL WORLD DATA NETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN801C.1	1	2	2	2	1	-	-	1	1	1	-	2	1	1	3
CO2	U18CN801C.2	2	3	2	2	2	-	-	1	1	1	-	3	3	2	3
CO3	U18CN801C.3	3	2	2	3	2	-	-	1	1	1	-	3	2	3	3
CO4	U18CN801C.4	1	2	3	2	1	-	-	1	1	1	-	3	2	2	3
U18CN801C		1.75	2.25	2.25	2.25	1.5	-	-	1	1	1	-	2.75	2	2	3

U18CN802A NETWORK AUTOMATION

Class: B.Tech. VIII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: software defined networking network and automation
LO2: python program migration, working with python modules and packages
LO3: data models in YANG, YAML, JSON
LO4: network automation using APIs, network automation tools

UNIT-I (9)

Network industry trends: The rise of Software Defined Networking, Open Flow.
Technologies and trends in SDN: Open Flow, Network Functions Virtualization, Virtual Switching, Network Virtualization, Device APIs, Network Automation, Bare metal Switching, Data center network fabrics, SD-WAN, controller networking.
Network Automation: Why Network Automation, Network Automation tasks, Evolving management plane from SNMP to device APIs, Network Automation in SDN Era
LINUX: Examining Linux in Network Automation context, Linux distributions. Networking in Linux

UNIT-II (9)

Python In A Network Context: Should Network Engineers learn to code, using python interactive interpreter, Data Types, Understanding Containment, Loops, using python Functions, Working with files.
Python Programming: Creating python programs, understanding shebang, migrating code from python interpreter to python script, working with python modules, passing arguments into python script
Packages: Using pip and installing python packages

UNIT-III (9)

Data Formats: Introduction to Data format, Types of data.
Data Models: YAML: Reviewing YAML basics, working with YAML in python, Data Models in YAML.XML**,** Reviewing XML Basics, Using XSD for Data Models, transforming XML with XSLT**.**
JSON: Reviewing JSON Basics, working with JSON in python, Using JSON schema for Data Models. YANG**:** overview, taking a deeper dive into YANG

Network Configuration Templates: Rise of modern template languages, Value of templates in network automation.

JINJA: Jinja for network configuration templates, Dynamically inserting data, Rendering a Jinja template, Conditions and loops, Jinja filters, Template creation

UNIT-IV (9)

Network APIs: HTTP-Based APIs: restful, non-restful.
NETCONF: overview, protocol stack. Exploring Network APIs: HTTP-Based APIs: cURL, Postman
Automating Using Network APIs: Using python requests Library, CISCO-NX API, Using python ncclient library. Using netmiko
Automation Tools: Reviewing Automation tools
ANSIBLE: Overview, understanding how Ansible works
SALT: Overview, Architecture, STACKSTORM: Event-Driven automation, concepts, Architecture

Text Book:

[1] Jasen Edelman, Scott.S Lowe & Matt Oswalt, *Network Programmability and Automation,* O'REILLY publishers, February 2018 First Edition *(Chapters: 1, 2, 3, 4, 5, 6, 7)*

Reference Books:

[1] Abhishek Ratan, *Practical Network Automation*, Packt publishers, 2018 Second Edition

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.
Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.
Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, student's will be able to…

CO1: examine linux distributions for network automation and programmability
CO2: create python scripts and modules to automate networks
CO3: develop data models with YAML,YAMS, JSON, YANG to exchange data between network devices
CO4: design automated networks using network API's and analyze networks using automation

Course Articulation Matrix (CAM): U18CN802A NETWORK AUTOMATION																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN802A.1	2	2	2	1	2	-	-	1	1	1	-	2	2	2	1
CO2	U18CN802A.2	2	2	2	2	1	-	-	1	1	1	-	2	2	2	1
CO3	U18CN802A.3	2	2	3	3	2	-	-	1	1	1	-	2	2	3	3
CO4	U18CN802A.4	2	3	2	3	3	-	-	1	1	1	-	2	2	3	3
U18CN802A		**2**	2.25	2.25	2.2	2	-	-	1	1	1	-	2	2	2.5	2

U18CN802B DATA SCIENCE

Class: B.Tech. VIII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: Data science fundamentals and basic statistical techniques
LO2: Concepts of data visualization techniques and various data analysis techniques
LO3: Concepts of data wangling techniques
LO4: Gradient descent, collecting and working with data

UNIT-I (9)

Introduction to Data Science: Data science, Terminology related with data science, Methods of data repository, Personnel involved with data science, Types of data, The Data Science Process (DSP), Popular data science toolkits, Familiarity with example applications

Data Analysis using R Programming Language: Introduction to applied statistical techniques, Types of statistical data, Types of big data analytics, Collecting data for sampling and distribution, Probability, Frequency distribution, Population and parameters, Central tendency or central value, Measures of central tendency, Different types of statistical means, Problems of estimation, Normal distribution curve

UNIT-II (9)

Data Visualization: Conventional data visualization methods, Retinal variables, Mapping variables to encodings, Introduction to Bokeh

Recent Trends in Data Science: Recent trends in various data collection and analysis techniques, Various big data visualization tools, Visualizing bigdata, Pre-attentive attributes, Challenges of bigdata visualization, Potential solutions

UNIT-III (9)

A Deep Dive into Data Wrangling with Python: Subsetting, filtering and grouping, Detecting outliers and handling missing values, Concatenating, merging and joining, Useful methods of Pandas, Working with the auditin come dataset (UCI)

UNIT-IV (9)

Gradient Descent: The idea behind gradient descent, Estimating the gradient, Using the gradient, Choosing the right step size, Putting it all together, Stochastic gradient descent

Getting Data: stdin and stdout, Reading files, Scraping the web, Using APIs, Example: Using the twitter APIs

Working with Data: Exploring your data, Cleaning and munging, Manipulating data, Rescaling, Dimensionality reduction

Text Books:

[1] V.K.Jain, *Data Science & Analytics*, NewDelhi: Khanna Book Publishing, 2018. (*Chapters:1,3,4,5,6*)
[2] Dr.Tirthajyoti Sarkarand Shubhadeep Roy chowdhury, *Data Wrangling with Python,* U.K:PacktPublishingLtd.,2019.(*Chapter:4*)
[3] Joel Grus, *Data Science from Scratch*, USA:O'ReillyMedia,Inc.,2015.(*Chapters:8,9,10*)

Reference Books:

[1] Dinesh Kumar, *Business Analytics*,NewDelhi:Wiley,2017
[2] CathyO' Neiland Rachel Schutt, *Doing Data Science, Straight Talk from The Frontline*, USA: O'Reilly, 2013
[3] Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, *Mining of Massive Datasets v2.1*, U.K.: Cambridge University Press, 2014
[4] Pratap Dangeti, *Statistics for Machine Learning,* U.K: Packt Publishing Ltd., 2017

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: examine the basic concepts of data science and compare different statistical techniques
CO2: choose appropriate encoding and data collection and analysis techniques suitable for pre-processing of data
CO3: apply various data wrangling techniques for the preprocessing of data
CO4: apply gradient descent to find the values of parameters of a function that minimizes a cost function

Course Articulation Matrix (CAM): U18CN802B DATA SCIENCE																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN802B.1	1	1	1	1	-	-	-	1	1	1	-	-	1	1	-
CO2	U18CN802B.2	2	2	2	1	1	-	-	1	1	1	-	1	1	1	-
CO3	U18CN802B.3	2	2	2	1	1	-	-	1	1	1	-	1	1	1	-
CO4	U18CN802B.4	1	1	1	1	1	-	-	1	1	1	-	1	1	1	1
U18CN802B		1.5	1.5	1.5	1	1	-	-	1	1	1	-	1	1	1	1

U18CN802C FOG AND EDGE COMPUTING

Class: B.Tech. VIII- Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: fundamental concepts of Fog computing
LO2: fundamental concepts of Edge computing
LO3: network slicing in Fog and Edge computing
LO4: optimize the performance of Fog and Edge based applications

UNIT-I (9)

Introduction: Relevant Technologies, Fog and Edge Computing Completing the Cloud, Advantages of FEC-SCALE, How FEC Achieves These Advantages: SCANC, Hierarchy of Fog and Edge Computing Outer-Edge, Business Models, Opportunities and Challenges

Introduction to Fog Computing: Fog Computing definition, Characteristics, Application Scenarios, Issues and Challenges, Cloud vs Fog computing

Fog Computing Architecture: Communication and Network Model, Programming Models.

Fog Computing Communication Technologies: Introduction, IEEE 802.11, 4G, 5G standards, WPAN, Short-Range Technologies, LPWAN and other medium and Long-Range Technologies.

Fog Computing Case Study: Intelligent Traffic Lights Management (ITLM) System

UNIT-II (9)

Introduction to Edge Computing: Edge Computing purpose and definition, Need of Edge Computing, Key Techniques that Enable Edge Computing, Characteristics, Application Scenarios, Edge vs Fog Computing. Edge computing architectures

Edge Computing Systems: Apache Edgent, OpenStack, EdgeX Foundry, Data Processing on the Edge, Edge computing applications

Challenges: The Networking Challenge, The Management Challenge, Miscellaneous Challenges

Edge Computing Case study: A Wearable ECG Sensor, Smart Home

UNIT-III (9)

Management and Orchestration of Network Slices in 5G, Fog, Edge and Clouds: Background, 5G, Cloud Computing, Mobile Edge Computing (MEC), Edge and Fog Computing

Network Slicing in 5G: Infrastructure Layer, Network Function and Virtualization Layer, Service and Application Layer, Slicing Management and Orchestration (MANO).**Network Slicing in Software-Defined Clouds**: Network-Aware Virtual Machines Management, Network-Aware Virtual Machine Migration Planning, Virtual Network Functions Management.

Network Slicing Management in Edge and Fog.

UNIT-IV (9)

Optimization Problems in Fog and Edge Computing: Introduction, The Case for Optimization in Fog Computing, Formal Modeling Framework for Fog Computing. **Metric:** Performance, Resource Usage, Energy Consumption, Financial Costs, Further

Quality Attributes, Optimization Opportunities along the Fog Architecture, Optimization Opportunities along the Service Life Cycle

Middleware for Fog and Edge Computing Design Issues: Need for Fog and Edge Computing Middleware, Design Goals, State-of-the-Art Middleware Infrastructures, System Model, proposed Architecture, Case Study Example – data analytics, mobility support, scheduling and security

Text Books:

[1] Rajkumar Buyya and Satish Narayana Sri rama - *Fog and Edge Computing: Principles and Paradigms,* 1st Ed. , Wiley Series on Parallel and Distributed Computing, 2019. *(Chapters 1, 2, 4, 5 and 6)*

Reference Books:

[1] Assad Abbas, Samee U. Khan, Albert Y. Zomaya -*Fog Computing: Theory and Practice,* 1stEd. Wiley Series on Parallel and Distributed Computing, 2020

[2] David Jensen - *Beginning Azure IoT Edge Computing: Extending the Cloud to the Intelligent Edge,* 1st Ed. MICROSOFT AZURE, *2021*

[3] Zaigham Mahmood - *Fog Computing Concepts, Frameworks and Technologies*, 1st Ed. , Springer publication, 2018

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, student's will be able to…

CO1: design applications based on Fog computing technologies
CO2: design applications based on Edge computing technologies
CO3: apply network slicing in 5G, software defined networks, Fog and Edge applications
CO4: analyze optimization problems and apply metrics with middleware technologies in Fog and Edge applications

Course Articulation Matrix (CAM): U18CN802C FOG AND EDGE COMPUTING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN802C.1	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO2	U18CN802C.2	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO3	U18CN802C.3	2	2	2	2	1	-	-	1	1	1	-	2	1	1	1
CO4	U18CN802C.4	2	2	2	2	1	-	-	1	1	1	-	2	1	1	1
U18CN802C		2	2	2	2	1	-	-	1	1	1	-	1.5	1	1	1

U18CN804 MAJOR PROJECT WORK PHASE-II

Class: B.Tech. VIII-Semester **Branch:** Computer Science & Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	14	7

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives(LOs):
The major project work will develop students' knowledge on /in …
LO1: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques
LO2: design/development of solutions to real-world engineering problems; conduct of investigations of complex problems; modern tool usage to design, build and test a prototype; impact of solution in society, environment and sustainability contexts
LO3: ethics, team work and project management skills such as budgeting, scheduling
LO4: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

1. **Major project work shall be continued in 8th semester as major project *phase-II*:** All the major project teams shall take the *phase -I* work forward and complete the remaining work as *Phase-II* in the 8th semester
2. *Final Year Major Project work represents the culmination of study towards the B. Tech degree.* ***Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems****. The* **Student Learning Assessment Process** *(SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project work*
3. Activities of major project SLAP shall be planned in such a way to ensure that the students acquire the essential knowledge, skills and qualities (KSQ) of a professional engineer
4. **Team work:** Major project work is a team work
   (i) The students of a project team shall work together to achieve a common objective
   (ii) Every student of a project team is expected to function effectively as an individual, and also with others as a team member in an ecosystem of team having knowledge diversity, gender diversity, social and cultural diversity among its members
5. **Two phases:** Major project work shall be carried out in two phases. Nearly 50 - 75% of the proposed work to be completed in 7th semester as *Phase-I* and the remaining work to be continued and completedin 8th semester as *Phase-II*
6. Every student is expected to put approximately **168 hours of work** into the major project *phase-II* course over the 12 weeks of 8th semester
7. **Major project work *Phase-II*: 8th semester**
   (i) The convener DPEC shall release complete schedule of Phase-II CIE during last week of 7th semester (well in advance before start of 8th semester), immediately after completion of progress presentation-I, so that student teams would complete the scheduled works during inter-semesterbreak and get ready with informative, confident and comfortable presentation for progresspresentation-II

(ii) **The project supervisors**: The project supervisors are expected to guide the students to systematically continue the *phase-I* work, useful work during inter-semester break, meeting the deadlines as proposed in project timeline

(a) The project supervisors shall ensure students focus on the project objectives and expected **deliverables**

(b) The project supervisors shall ensure students have sufficient resources for successful completion of project

(c) **The project supervisors shall continue guiding students on**

(i) *Knowledge, skills and qualities (KSQ) of a professional engineer to be acquired* to propose solutions and design the systems to the identified real-world problems

(ii) *Problem analysis* - to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

(iii) *Applying engineering knowledge* - to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

(iv) *Design/development of solutions* - to design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations

(v) *Conduct investigations of complex problems* - to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

(vi) *Modern tool usage* – to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

(vii) *Engineering and society* – to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

(viii) *Environment and sustainability* – to understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need forsustainable development

(ix) *Ethics* – to apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice

(x) *Individual and team work* – to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

(xi) *Communication* – to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and

write effective reports and design documentation, make effective presentations, and give and receive clear instructions

(xii) *Project management and finance* – to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

(xiii) *Life-long learning* – to recognize the need for, and have the preparation and ability to engage in independent and life-longlearning in the broadest context of technological change

(d) The project supervisors are also expected to continuously emphasize and guide the studentson

(i) **Following project timeline**: completing the tasks as planned in project timeline

(ii) **Meeting Cadence:**

1. **Regular meetings with supervisor:** Short and frequent meetings increase a team's work momentum. Regular meetings with supervisor to review the status of project are very essential. All students of the team shall participate in discussions and take notes
2. **Meeting Frequency: Semi-weekly cadence,** i.e., the meeting frequency shall be **twice a week.** Due weightage will be given to meeting cadence and considered for evaluation during presentations, i.e., number of planned meetings and number attended by students

(iii) **Project Log Book:** The activity journaling in project log book is very important for asuccessful project

(a) Project log book is a written record showing the daily project activity on project goals from the very first thing like starting the project (an introduction statement what the project is all about), to the completion of the work (including the final results, and whether project met the core objectives / outcomes, etc.)

(b) In project log book, the activities like regular meetings with project supervisor, and work carried out on daily/weekly basis are to be recorded. This ensures that the student progress is being monitored well

(c) The project supervisor shall regularly check the log book of every student of project team and endorse each and every activity by affixing his signature with date. With this, the number of planned meetings and number attended by the students will be also monitored

(d) Log books are to be shown during all presentations and will be graded along with the project

(e) At the conclusion of the project work *phase-II*, the supervisor shall specifically comment, in the project log book, on whether the project team met each of the project work outcomes and to give evidence which describes the quality of work. For project teams, this also serves as self-assessment

(f) **Writing down whatever is done and making notes of whatever is read**. Writing down the procedures / models followed, designs made, experiments conducted, simulations carried out,

intermediate results obtained, ***difficulties faced and how they were fixed*** are very important. Thiskind of documenting the whole process as we go with project implementation is a very effective way and will help preparing a well documented report having original content. Note down and include information about all the resources that you used, magazines, Journals, patents, books, and so on. This information will be needed for the bibliography in your project report. On the other hand, documenting a report ***on the spur of the moment*** would end up copying things from other sources resulting in a plagiarized document

(xvi) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(xvii) **Good and sufficient literature review**: Literature review is a description and analysis of information related to the topic of project work. Reading good number of review articles, research articles published in recent issues of peer reviewed journals, technical magazines, patents, reference books on the topics of potential interest, will help one understand what has already been discovered and what questions remain to identify gaps in the literature

(xviii) Completing the proposed work by the end of *phase-II*

(xix) Right conduct of research to promote academic integrity, honesty and time management

(xx) Preparing a well-documented overall project report in proper format, covering the complete work carried out during both the phases (*phase-I and phase-II*)

(xxi) Consequences of plagiarism, and use of anti-plagiarism software to detect plagiarism in the report

(xxii) Submission of major project work report within acceptable plagiarism levels, as per the Anti-plagiarism policy-2020 of our institute

(xxiii) **Video pitch on complete project work**: Capturing short videos, photos, screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed during course of project execution, photos showing interaction with supervisor for creating a short video pitch on the complete work done during both phases (phase-I and phase-II)

(xxiv) Project Paper: Writing a technical paper at the end of *phase-II* based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peerreviewed journal

(xxv) Project poster: At the end of phase-II, the project teams shall have to present their project in the form of posters, at the time of demonstration of complete prototype /working model / software package / system developed

(xxvi) **Phase – II evaluation**: There shall be only Continuous Internal Evaluation (CIE) for major project work *phase-II* with following components

(a) **Progress Presentation -II** *(during third / fourth week of 8th semester):* The progress presentation-II shall include the identified problem, objective(s), literature review, expected outcome(s), results of work done as per project plan timeline

(i) **Following project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline
(ii) 80-85% of work is expected to be completed
(iii) Project teams shall compulsorily show the following as part of their progress presentation-II
    1. *The slides on project timeline and*
    2. *A table showing targeted tasks as per timeline and status – whether tasks accomplished?*
(iv) **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (with due signatures of project supervisor) during presentations

(b) **Final Presentation** *(during penultimate week of 8th semester):* **Project supervisor shall ensure that the project team has accomplished 100% of work proposed.** The project team shall
(i) **Follow project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline
(ii) compulsorily show the following as part of their final presentation
    1. *The slides on project timeline and*
    2. *A table showing targeted tasks as per timeline and whether all the identified tasksaccomplished?*
(iii) **show project log book**: Every student of the Project team shall compulsorily show the complete activity journaling in the log book (*with due signatures of project supervisor*)
(iv) present complete results & analysis
(v) **demonstrate the completed project**: working model / process / software package / system developed
(vi) demonstrate the completed project with the **project poster presentation**

(xxvii) There shall be continuous internal evaluation (CIE) and end semester examination (ESE). The evaluationfor *phase-II* shall be as given below:

Assessment	Weightage
A. CIE **(i) Supervisor Assessment (10%)** **(ii) DPEC Assessment (50%)** *(a) Progress presentation-II (10%)* *(b) Final presentation (10%)* *(c) Working model / process / software package / system developed (20%)* *(d) Project video pitch (5%)* *(e) Project paper (5%)*	**60%**
B. ESE *(i) Well-documented project report (15%)* *(DPEC shall evaluate the project reports, as per the rubrics, well before the ESE. At the time of ESE, evaluated project report marks shall be posted in the award list, along with the ESE oral presentation marks. Students shall appear for Viva-Voce with project report)* *(ii) Oral presentation with PPTs and viva-voce (15%)* *(iii) Project poster (5%)* *(DPEC shall evaluate the project poster, as per the rubrics, well before the ESE. At the time of ESE, evaluated project poster marks shall be posted in the award list. Students shall appear for Viva-Voce with project poster)*	**40%**
Total Weightage	**100%**

(a) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The completed working model/ process/software package/system shall be demonstrated during final presentation at the end of *phase-II*

(b) **Video pitch**: Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I & phase-II*. The project team shall present the produced video pitch during Final presentation. The produced video pitch should

- *(i)* be 3 to 5-minute-long video (no longer than 5 minutes)
- *(ii)* be concise and to the point, on the problem, proposed solution and its salient features
- *(iii)* show project timeline and sample page of log book
- *(iv)* highlight the various stages during project implementation with the help of short videos / photos / screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed as part of proposed solution and also photos showing team interactions with supervisor and the team working in the lab on project
- *(v)* discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts*
- *(vi)* emphasize key points about *business idea, potential market for the proposed solution*

(c) **Project poster**: At the end, the project teams shall present their project in the form of posters (A2 size). The teams shall have to present their work during the poster presentation session scheduled at the end of the 8th semester, at the time of demonstration of complete porotype / working model / software package / system developed

(d) **Well-documented plagiarism-cleared project report**: Every project team shall be required to submit a well-documented project report on the work carried out, as per the format specified by the DPEC. The report should clear plagiarism check as per the anti-plagiarism policy-2020 of the institute. The following shall compulsorily be included in the Results-Chapter of the project report

(i) Photos / screen shots taken at various stages during the development of working model/ process/software package/system as part of Results-Chapter

(ii) Snapshot of final working model/ process/software package/system developed

(iii) Pictures of the team working in the lab, the team discussing with the project supervisor, working on creative project, or an event they are attending for work

(iv) *All these photos / screen shots shall be properly referred in the project report by assigning figure numbers*

(e) **Tangible outcomes of project work in Conclusions - Chapter:** These are the lessons learnt from doing a project work. The students have to describe in their own words what they learnt from the project work experience. They have to describe what specific KSQs are acquired by them, with reference to the expected COs, after successful completion of major project work. Finally, a table depicting systematic mapping of what they have learnt and the expected major project work COs, is to be shown in the conclusions chapter

(f) **Student feedback on major project in Conclusions - Chapter:** To gather information on whether project work was useful and gave practical experience on chosen field of interest, and other learning, a well-defined feedback questionnaire (*made available by the dept*) with closed and open questions shall be kept in the conclusions chapter of the project report

(xxviii) It is mandatory for

(a) every student of the team to appear for ESE oral presentation and viva-voce, to qualify for course evaluation

(b) every project team to write a technical paper based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal

(c) every project team shall be required to create a pitch video, which is a video presentation on theirmajor project work *phase-I & phase-II*

(d) every project team shall present their project in the form of a poster, during the demonstration of complete porotype / working model / software package / system developed

(xxix) The student has to register for the Major project work *phase-II* as supplementary examination in the following cases:

(a) he/she is absent for oral presentation and viva-voce as part of ESE

(b) he/she fails to fulfill the requirements of Major project work *phase-II* evaluation as perspecified guidelines

(xxx) Supplementary examination for Major project work *phase-I*I

(a) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned

(b) The DPEC, duly constituted by the HoD, shall conduct Major project phase-I supplementary examand send the award list to the CoE within the stipulated time

Course Outcomes (COs):

Upon completion of major project work, students will be able to…

*CO1: review research literature, identify gaps in the literature, formulate problem, apply knowledge of mathematics, sciences, engineering fundamentals, experimental and data analysis techniques; synthesize technical knowledge and innovative approaches to generate suitable solutions for real-world complex engineering problems (**Technical skills**)*

*CO2: design a system or product based on product/customer specifications; develop, analyze, and critically evaluate the design alternatives in order to justify the solutions to a real-world problem guided by ethical, environmental, societal and sustainable development considerations; use modern engineering and IT tools to design, build and test a prototype within specified project timeline and budget (**Problem solving and critical thinking skills**)*

*CO3: apply project management and organizational skills; demonstrate integrity, leadership, creativity, professional and ethical responsibilities as an individual and as a member or leader to produce time-sensitive deliverables in a multi-disciplinary team (**Ethics and teamwork**)*

*CO4: collate the results, compare performance of prototype to design specifications and present clearly and effectively the proposed solution, conclusions and/or recommendations in written (report, poster, technical paper), oral (presentations) and multimedia formats (video pitch) and engage in self-directed independent learning and life-long learning demonstrating the KSQ of a professional engineer (**Communication skills and life-long learning**)*

Course Articulation Matrix (CAM):U18CN804 MAJOR PROJECT WORK PHASE-II

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN804.1	2	2	2	2	-	-	-	3	-	2	-	3	3	3	3
CO2	U18CN804.2	1	2	2	-	2	2	2	3	-	-	-	3	3	3	3
CO3	U18CN804.3	-	-	-	-	-	-	-	3	2	-	2	3	3	3	3
CO4	U18 CN804.4	-	-	2	2	-	-	-	3	-	2	-	3	3	3	3
U18CN804		1.5	2	2	2	2	2	2	3	1	2	2	3	3	3	3

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

(An Autonomous Institute under Kakatiya University, Warangal)

(Sponsored by EKASILA EDUCATION SOCIETY)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B)

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