

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 प्रौद्योगिकी 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)

website: www.kitsw.ac.in

E-mail: principal@kitsw.ac.in

☎ : +91 9392055211, +91 7382564888

• **B.Tech.** •

CIVIL ENGINEERING

Rules & Regulations for Under Graduate Programme

B.Tech. 4-Year Degree Programme (URR-18R22)

(Applicable from the Academic Year 2022-23)

SYLLABI (I to VIII SEMESTERS)

Estd: 1980
KITSW**KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE**

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

కాకతీయ ప్రేక్షాగిక్కి ఁవ్ విజ్ఞాన సంస్థాన, వరంగల్ - ౪౦౬ ౦౧౫ తెలంగాణ, భారత్

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

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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 CIVIL ENGINEERING**VISION OF THE DEPARTMENT**

- The Vision of the department is to become a leading centre of excellence in producing quality human resource in civil engineering by developing a sustainable technical education system to meet the changing technological needs of the Country. The Department will make significant contributions to the economic development of the state, region and nation.

MISSION OF THE DEPARTMENT

- The Mission of Civil Engineering Department is to produce outstanding Civil Engineering graduates with highest ethics.
- To impart quality education in civil engineering to raise satisfaction Level of all Stake holders.
- To serve society and the nation by providing professional civil Engineering Leadership to find solution to community, regional and Global problems and accept new challenges in rapidly changing Technology.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
UG - CIVIL ENGINEERING - CE	
PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	<i>Within first few years after graduation, the CIVIL ENGINEERING graduates will be able to ...</i>
PEO1: Technical Expertise	<i>Demonstrate professional competency in varied fields of engineering industry and/or pursue higher education by nourishing mathematical scientific and engineering precepts.</i>
PEO2: Successful Career	<i>Investigate, analyze and design solutions to complex civil engineering problems ensuring safety, sustainability and ecological harmony</i>
PEO3: Soft Skills and Professionalism	<i>Exhibit professionalism by transferring latest technology and understanding societal impacts to protect interests of the public at large.</i>
PEO4: Life Long Learning	<i>Develop competence by engaging in lifelong learning, in order to integrate ethics, economics and equity.</i>

PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)	
UG - CIVIL ENGINEERING - CE	
PROGRAM OUTCOMES (POs)	<i>At the time of graduation, the CIVIL ENGINEERING graduates will be able to ...</i>
PO1: Engineering knowledge	<i>apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems</i>
PO2: Problem analysis	<i>identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences</i>
PO3: Design development of solutions	<i>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</i>
PO4: Conduct investigations of complex problems	<i>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</i>
PO5: Modern tool usage	<i>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</i>

PO6: The engineer and society	<i>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</i>
PO7: Environment and sustainability	<i>understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development</i>
PO8: Ethics	<i>apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice</i>
PO9: Individual and team work	<i>function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings</i>
PO10: Communication	<i>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</i>
PO11 Project management and finance	<i>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</i>
PO12: Life-long learning	<i>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</i>

PROGRAM SPECIFIC OUTCOMES (PSOs):	
PSO1	<i>Apply fundamental computational methods and elementary analytical techniques in sub-disciplines related to civil engineering</i>
PSO2	<i>Design civil engineering structures, component or process to meet desired needs with appropriate consideration for the public health and safety, cultural, societal, sustainability and environmental considerations</i>
PSO3	<i>Appreciate professional and ethical responsibility concerning legal, contemporary, environmental & cultural issues and consequent responsibilities relevant to the professional engineering practices and norms of civil engineering practice code</i>
PSO4	<i>Appreciate the role of research in civil engineering practice and recognize the need for and to engage in life-long learning in civil engineering and allied domains as relevant to rapidly changing technology</i>



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : B.Tech. - CE / EEE / ECE / ECI / CSE (AI&ML), DS (Stream - II)
SEMESTER : FIRST

URR-18R22

Sl. No	Course Category	Course Code	Course Name	Periods/week			Credits	Evaluation Scheme				Total Marks	
				L	T	P		C	CIE				ESE
									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	U18CH103	Engineering Chemistry	3	1	-	4	10	30	40	60	100	
4	ESC	U18ME104	Engineering Drawing	2	-	4	4	10	30	40	60	100	
5	ESC	U18CE105	Engineering Mechanics	3	1	-	4	10	30	40	60	100	
6	ESC	U18CS107	Programming for Problem Solving using C Laboratory	-	-	2	1	40	-	40	60	100	
7	BSC	U18CH108	Engineering Chemistry Laboratory	-	-	2	1	40	-	40	60	100	
8	MC	U18CH109	Environmental Studies*	2	-	-	-	10	30	40	60	100	
9	MC	U18EA110	EAA* : Sports/Yoga/NSS	-	-	2	-	100	-	100	-	100	
10	MC	U18MH111	Universal Human Values - I (Induction Programme)	-	-	-	-	-	-	-	-	-	
Total				16	3	10	21	240	180	420	480	900	

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment;

MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

* indicates mandatory non-credit course

Student Contact Hours / Week : 29 (periods/week)

Total Credits (C) : 21 Credits



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : B.Tech. - CE / EEE / ECE / ECI / CSE (AI&ML), DS (Stream - II)
SEMESTER : SECOND

Sl. No	Course Category	Course Code	Course Name	Periods/week			Credits		Evaluation Scheme				
				L	T	P	C	TA	CIE		ESE	Total Marks	
									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	U18PH203	Engineering Physics	3	1	-	4		10	30	40	60	100
4	HSMC	U18MH204	English for Communication	2	-	2	3		10	30	40	60	100
5	ESC	U18EE205	Basic Electrical Engineering	3	1	-	4		10	30	40	60	100
6	ESC	U18EE206	Basic Electrical Engineering Laboratory	-	-	2	1		40	-	40	60	100
7	ESC	U18CS207R1	Data Structures through C Laboratory	-	-	2	1		40	-	40	60	100
8	BSC	U18PH208	Engineering Physics Laboratory	-	-	2	1		40	-	40	60	100
9	ESC	U18ME209	Workshop Practice	-	-	2	1		40	-	40	60	100
10	MC	U18EA210	EAA* : Sports/Yoga/NSS	-	-	2	-		100	-	100	-	100
Total				14	3	12	22		310	150	460	540	1000

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment; MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

* indicates mandatory non-credit course

Student Contact Hours / Week : 29 (periods/week)
Total Credits (C) : 22 Credits



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

III SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

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	U18MH301	Engineering Mathematics - III	3	1	-	4	10	30	40	60	100	
2	HSMC	U18TP302	Soft & Interpersonal Skills	-	-	2	1	100	-	100	-	100	
3	OE	U18OE303	Open Elective-I	3	-	-	3	10	30	40	60	100	
4	PCC	U18CE304	Fluid Mechanics	3	-	-	3	10	30	40	60	100	
5	PCC	U18CE305	Surveying	3	-	-	3	10	30	40	60	100	
6	PCC	U18CE306	Construction Materials	3	-	-	3	10	30	40	60	100	
7	PCC	U18CE307	Concrete Technology Laboratory	-	-	2	1	40	-	40	60	100	
8	PCC	U18CE308	Surveying Field Work-I	-	-	2	1	40	-	40	60	100	
9	OE	U18OE311	Open Elective-I based Laboratory	-	-	2	1	40	-	40	60	100	
Total				15	1	8	20	270	150	420	480	900	

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] Stream-I CSE,IT,ME Stream-II EEE, ECE, EIE, CETotal

Contact Periods/Week:24

Total Credits :20

Open Elective-I: U18OE303A: Object Oriented Programming (CSE) U18OE303B: Fluid Mechanics & Hydraulic Machines (CE) U18OE303C: Mechatronics (ME) U18OE303D: Web Programming (IT) U18OE303E: Microprocessors (ECE) U18OE303F: Strength of Materials (CE)	Open Elective-I based Lab: U18OE311A: Object Oriented Programming Lab (CSE) U18OE311B: Fluid Mechanics & Hydraulic Machines Lab (CE) U18OE311C: Mechatronics Lab (ME) U18OE311D: Web Programming Lab (IT) U18OE311E: Microprocessors Lab (ECE) U18OE311F: Strength of Materials Lab (CE)
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DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
IV SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme			
				L	T	P		TA	MSE	CIE Total	ESE Total Marks
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60
2	HSMC	U18MH402	Professional English	-	-	2	1	100	-	100	100
3	PCC	U18CE403	Mechanics of Materials	3	1	-	4	10	30	40	60
4	PCC	U18CE404	Hydraulics Engineering	3	-	-	3	10	30	40	60
5	PCC	U18CE405	Design of Reinforced Concrete Structures	3	1	-	4	10	30	40	60
6	PCC	U18CE406	Engineering Geology	3	-	-	3	10	30	40	60
7	PCC	U18CE407	Hydraulic and Hydraulic Machinery Laboratory	-	-	2	1	40	-	40	60
8	PCC	U18CE408	Engineering Geology Laboratory	-	-	2	1	40	-	40	60
9	PCC	U18CE409	Surveying Field Work-II	-	-	2	1	40	-	40	60
10	MC	U18MH415	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60
Total:				17	3	8	22	280	180	460	900
11	MC	U18CH416	Environmental Studies*	2	-	-	-	10	30	40	60

Stream-I: CSE, CSN, IT, ME Stream-II: EEE, ECE, EIE, CE, ECI

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

**For Lateral entry students only*

Total Contact Periods/Week : 28 Total Credits : 22

Open Elective-II:	
U18OE401A:	Applicable Mathematics (MH)
U18OE401B:	Basic Electronics Engineering (ECE)
U18OE401C:	Elements of Mechanical Engineering (ME)
U18OE401D:	Fundamentals of Measurements & Instrumentation (EIE)
U18OE401E:	Computer Networks (IT)
U18OE401F:	Renewable Energy Sources (EEE)



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DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

V SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

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	U18MH501	Universal Human Values - II*	2	-	-	-	10	30	40	60	100	
2	PE	U18CE502	Professional Elective – I/ MOOC-I	3	-	-	3	10	30	40	60	100	
3	PCC	U18CE503	Structural Analysis	3	-	-	3	10	30	40	60	100	
4	PCC	U18CE504	Environmental Engineering	3	-	-	3	10	30	40	60	100	
5	PCC	U18CE505	Soil Mechanics	3	-	-	3	10	30	40	60	100	
6	PCC	U18CE506	Design of Steel Structures	3	-	-	3	10	30	40	60	100	
7	PCC	U18CE507	Environmental Engineering Laboratory	-	-	2	1	40	-	40	60	100	
8	PCC	U18CE508	Soil Mechanics Laboratory	-	-	2	1	40	-	40	60	100	
9	PCC	U18CE509	Building Planning and Drawing Laboratory	-	-	2	1	40	-	40	60	100	
10	PROJ	U18CE510	Seminar	-	-	2	1	100	-	100	--	100	
Total				17	-	8	19	280	180	460	540	1000	
Additional Learning*:Maximum credits allowed for Honours/Minor				-	-	-	7	-	-	-	-	-	
Total credits for Honours/Minor students:							19+7						

- Additional Learning*:Maximum credits allowed for Honours/Minor**
- 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 = Practical's & C = Credits]

Total Contact Periods/Week: 25

Professional Elective-I/MOOC-I:

U18CE502A: Advanced Concrete Technology

U18CE502B: Advanced Surveying

U18CE502C: Water shed Management

U18CE502M: MOOCs



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VI SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

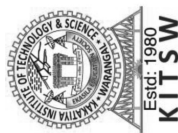
URR-18R22

VI – Semester (New Proposal)

Sl.No	Category	Course Code	Course Title	Periods/week				Credits	Evaluation Scheme				
				L	T	P	C		TA	MSE	CIE	ESE	Total Marks
1	HSMC	U18TP601	Quantitative Aptitude & Logical Reasoning	2	-	-	1	1	10	30	40	60	100
2	ESC	U18CS611	Advance Data Structures	3	-	-	3	3	10	30	40	60	100
3	PE	U18CE603	Professional Elective – II/MOOC-II	3	-	-	3	3	10	30	40	60	100
4	PCC	U18CE604	Estimation and Valuation	1	2	-	3	3	10	30	40	60	100
5	PCC	U18CE605	Hydrology and Water Resources Engineering	3	-	-	3	3	10	30	40	60	100
6	PCC	U18CE606	Construction Management and Equipment	3	-	-	3	3	10	30	40	60	100
7	ESC	U18IT611	Object Oriented Programming through JAVA	3	-	-	3	3	10	30	40	60	100
8	PCC	U18CE607	Structural Engineering Detailing Laboratory	-	-	2	1	1	40	-	40	60	100
9	ESC	U18IT612	JAVA Programming Laboratory	-	-	2	1	1	40	-	40	60	100
10	ESC	U18CS612	Advance Data Structures Lab	-	-	2	1	1	40	-	40	60	100
11	PROJ	U18CE608	Mini Project	-	-	2	1	1	100	-	100	--	100
Total				18	2	8	23	23	250	210	460	540	1000
Additional Learning* : Maximum credits allowed for Honours /Minor				Total credits for Honours/Minor students:				7	-	-	-	-	-
• List of courses for additional learning through MOOCs towards Honours / Minor in Engineering shall be prescribed by the department under Honours / Minor Curricula				-	-	-	23+7	-	-	-	-	-	-

[L=Lecture, T=Tutorials, P= Practical's & C=Credits]	Total Contact Periods/Week: 27
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Professional Elective-II / MOOC-II U18CE603A: Advanced Analysis of Structures U18CE603B: Ground Improvement Techniques	U18CE603C: Advanced Environmental Engineering U18CE603M: MOOCs
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DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
VII SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

VII- Semester (New Proposal)

Sl. No	Category	Course Code	Course Title	Periods/week			Credits		Evaluation Scheme			
				L	T	P	C		TA	MSE	CIE Total	ESE Total Marks
1	OE	U18OE701	Open Elective-III	3	-	-	3		10	30	40	60
2	PE	U18CE702	Professional Elective-III/MOOC-III	3	-	-	3		10	30	40	60
3	PE	U18CE703	Professional Elective-IV/MOOC-IV	3	-	-	3		10	30	40	60
4	PCC	U18CE704	Highway Engineering	3	-	-	3		10	30	40	60
5	PCC	U18CE705	Highway Engineering Laboratory	-	-	2	1		40	-	40	60
6	PCC	U18CE706	Civil Engineering Software Applications Laboratory	-	-	2	1		40	-	40	60
7	PROJ	U18CE707	Major Project-Phase-I	-	-	6	3		100	-	100	-
8	MC	U18CE708	Internship Evaluation*	-	-	2	-		100	-	100	-
Total				12	-	12	17		320	120	440	360
Additional Learning*: Maximum credits allowed for Honours/Minor				-	-	-	7		-	-	-	-
Total credits 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

Total Contact Periods/Week: 24

[L=Lecture, T=Tutorials, P= Practical's & C=Credits]

Open Elective-III: U18OE701A: Disaster Management U18OE701B: Project Management U18OE701C: Professional Ethics in Engineering U18OE701D: Management Economics and Accountancy	Professional Elective-III/MOOC-III: U18CE702A: Advanced Structural Design U18CE702B: Hydraulic Structures U18CE702C: Sustainable Materials and Green Buildings U18CE702M: MOOCs	Professional Elective-IV/MOOC-IV: U18CE703A: Structural Dynamics U18CE703B: Foundation Engineering U18CE703C: Repair and Rehabilitation of Structures U18CE703M: MOOCs
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DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
VIII SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation Scheme				
				L	T	P		C	CIE			Total Marks
									TA	MSE	Total	
1	PE	U18CE801	Professional Elective–V/MOOC-V	3	-	-	3	10	30	40	60	100
2	PE	U18CE802	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	U18CE804	Major Project-Phase-II	-	-	14	7	40	-	40	60	100
Total:				9	-	14	16	70	90	160	240	400
Additional Learning*: Maximum credits allowed for Honours/Minor				-	-	-	7	-	-	-	-	-
Total credits 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=Practical's & C=Credits] Total Contact Periods / Week: 23 Total Credits: 16

Professional Elective-V/MOOC-V: U18CE801A: Prestressed Concrete U18CE801B: Railway and Airport Engineering U18CE801C: Construction Contracts Management U18CE801M: MOOCs	Professional Elective-VI/MOOC-VI: U18CE802A: Earth quake Resistant Design of Structures U18CE802B: Earth Retaining Structures U18CE802C: Bridge Engineering U18CE802M: MOOCs	Open Elective-IV/MOOC-VII: U18OE803A: Operations Research U18OE803B: Management Information Systems U18OE803C: Entrepreneurship Development U18OE803D: Forex and Foreign Trade U18OE803M: MOOCs
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KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

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

కాకతీయ ప్రాధ్మిక విజ్ఞాన సంస్థాన, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

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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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)
 12. B.Tech Computer Science & Engineering (Data Science)
- 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
- cleared all institute and hostel dues of previous semesters
 - paid all required prescribed fees for the current academic year
 - not been debarred / detained from registering for a specified period on disciplinary or any other grounds
 - 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
- The duration of the programme leading to B.Tech degree will be 8 semesters (4 academic years)
 - 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, Mandatory Courses (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:

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

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**

- The first letter, to represent the **Under Graduate Programme**
Ex. U for Undergraduate Course
- 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
- The next two letters, to represent the concerned department offering that course.
Ex. CE for Civil Engineering
- 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: <i>Oral presentation with PPT and viva-voce</i>	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%
<i>DMPEC Assessment: Oral presentation with PPT and viva-voce</i>	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 (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

- 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) <i>Progress presentation-II (10%)</i> (b) <i>Final presentation (10%)</i> (c) <i>Working model / process / software package / system developed (20%)</i> (d) <i>Project video pitch (5%)</i> (e) <i>Project paper (5%)</i>	60%
B. ESE (i) <i>Well-documented project report (15%)</i> (ii) <i>Oral presentation with PPTs and viva-voce (15%)</i> (iii) <i>Project poster (5%)</i>	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 prototype / 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
- 35 percent of marks assigned to End Semester Examination (ESE) **and**
 - 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:

$$SGPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

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:

$$CGPA = \frac{\sum_{i=1}^m C_i G_i}{\sum_{i=1}^m C_i}$$

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 of the both revaluators 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 6 th 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 $6.50 \leq \text{CGPA} < 8.0$ 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 $5.50 \leq \text{CGPA} < 6.50$ 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 $4.0 \leq \text{CGPA} < 5.50$ 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 <u>but not used</u>	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 <u>but used</u>		-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 **2018**
- c) The next two letters, to represent the concerned department to which the student belongs.
Ex: CE for **Civil Engineering**
- 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 **2018** in **Civil Engineering** 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.

ISO 9001:2015

AICTE-CII: GOLD Category Institute

NAAC-'A' Grade Institute (CGPA: 3.21)

NIRF-2022 Rank Band : 201-250



Estd: 1980
KITSW

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

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

काकतीय प्रौद्योगिकी 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



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : B.Tech. - CE / EEE / ECE / ECI / CSE (AI&ML), DS (Stream - II)

SEMESTER : FIRST

UJR-18R22

Sl. No	Course Category	Course Code	Course Name	Periods/week			Credits	Evaluation Scheme					Total Marks
				L	T	P		C	CIE			ESE	
									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	U18CH103	Engineering Chemistry	3	1	-	4	10	30	40	60	100	
4	ESC	U18ME104	Engineering Drawing	2	-	4	4	10	30	40	60	100	
5	ESC	U18CE105	Engineering Mechanics	3	1	-	4	10	30	40	60	100	
6	ESC	U18CS107	Programming for Problem Solving using C Laboratory	-	-	2	1	40	-	40	60	100	
7	BSC	U18CH108	Engineering Chemistry Laboratory	-	-	2	1	40	-	40	60	100	
8	MC	U18CH109	Environmental Studies*	2	-	-	-	10	30	40	60	100	
9	MC	U18EA110	EAA* : Sports/Yoga/NSS	-	-	2	-	100	-	100	-	100	
10	MC	U18MH111	Universal Human Values - I (Induction Programme)	-	-	-	-	-	-	-	-	-	
Total				16	3	10	21	240	180	420	480	900	

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment;

MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

* indicates mandatory non-credit course

Student Contact Hours / Week : 29 (periods/week)

Total Credits (C) : 21 Credits

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : B.Tech. - CE / EEE / ECE / ECI / CSE (AI&ML), DS (Stream - II)

SEMESTER : SECOND

Sl. No	Course Category	Course Code	Course Name	Periods/week			Credits		Evaluation Scheme				
				L	T	P	C	TA	CIE		ESE	Total Marks	
									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	U18PH203	Engineering Physics	3	1	-	4		10	30	40	60	100
4	HSMC	U18MH204	English for Communication	2	-	2	3		10	30	40	60	100
5	ESC	U18EE205	Basic Electrical Engineering	3	1	-	4		10	30	40	60	100
6	ESC	U18EE206	Basic Electrical Engineering Laboratory	-	-	2	1		40	-	40	60	100
7	ESC	U18CS207R1	Data Structures through C Laboratory	-	-	2	1		40	-	40	60	100
8	BSC	U18PH208	Engineering Physics Laboratory	-	-	2	1		40	-	40	60	100
9	ESC	U18ME209	Workshop Practice	-	-	2	1		40	-	40	60	100
10	MC	U18EA210	EAA* : Sports/Yoga/NSS	-	-	2	-		100	-	100	-	100
Total				14	3	12	22		310	150	460	540	1000

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment;

MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

* indicates mandatory non-credit course

Student Contact Hours / Week : 29 (periods/week)

Total Credits (C) : 22 Credits

U18MH101 ENGINEERING MATHEMATICS- I

Class: B.Tech. I-Semester

Branch(s): ME, CSE, IT, CSN, CSIOT
CE, EEE, ECE, ECI, CSAIML, DS

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. Lagrange'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 Wiley & 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 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		P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
C01	U18MH101.1	3	2	1	--	--	--	--	--	--	--	--	1	-	-
C02	U18MH101.2	3	3	2	--	--	--	--	--	--	--	--	1	-	-
C03	U18MH101.3	3	2	2	--	--	--	--	--	--	--	--	1	-	-
C04	U18MH101.4	3	3	2	--	--	--	--	--	--	--	--	1	-	-
U18MH101		3	2.5	1.75	--	--	--	--	--	--	--	--	1		

U18CS102 PROGRAMMING FOR PROBLEM SOLVING USING C

Class: B.Tech. I -Semester

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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

L01: computer fundamentals and concepts of problem solving using structured programming paradigm

L02: control structures and array operations

L03: string functions and modular programming concepts

L04: 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. Kernighan 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 Learning Outcomes (COs):

After 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 with functions

CO4: implement structures, unions, pointers and files in C programming

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	PS01	PS02	PS03
CO1	U18CS102.1	1	1	-	-	-	-	-	-	-	1	-	1	2	1	1
CO2	U18CS102.2	1	2	2	1	-	-	-	-	-	1	-	1	2	2	2
CO3	U18CS102.3	1	2	2	1	-	-	-	-	1	1	-	1	2	2	2
CO4	U18CS102.4	1	2	2	2	1	-	-	-	1	1	-	1	2	2	2
U18CS102		1	1.75	2	1	1	-	-	-	1	1	-	1	2	1.75	1.75

U18CH103 ENGINEERING CHEMISTRY

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

Branch(s) : CE, EEE, ECE, ECI, CSAIML, DS
ME, CSE, CSN, IT, CSIoT

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(SN¹ and SN²), 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 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): U18CH103 ENGINEERING CHEMISTRY

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	U18CH103.1	2	2	1	1	1	-	1	-	1	-	-	-	-	-
CO2	U18CH103.2	2	1	2	2	-	1	1	-	2	-	-	-	-	-
CO3	U18CH103.3	2	1	1	2	-	1	-	-	2	-	-	-	-	-
CO4	U18CH103.4	1	-	1	2	-	1	-	-	2	-	-	-	-	-
U18CH103		1.75	1.33	1.25	1.75	1.00	1	1	-	1.75	-	-	-	-	-

U18ME104 , ENGINEERING DRAWING

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

Branch(s): CE, EEE, ECE, ECI, CSAIML, DS
ME, CSE, CSN, IT, CSIoT

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 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): U18ME104 ENGINEERING DRAWING													
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	U18ME104.1	2	1	1	-	-	-	-	-	-	1	-	1
CO2	U18ME104.2	2	1	1	-	-	-	-	-	-	1	-	1
CO3	U18ME104.3	2	1	1	-	-	-	-	-	-	1	-	1
CO4	U18ME104.4	2	1	1	-	1	-	-	-	-	1	-	1
U18ME104		2	1	1	-	1	-	-	-	-	1	-	1

U18CE105 ENGINEERING MECHANICS

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

Branch(s): CE, EEE, ECE, ECI, CSAIML, DS
ME, CSE, CSN, IT, CSIoT

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 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): U18CE105 ENGINEERING MECHANICS

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE105.1	1	2	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE105.2	1	2	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE105.3	1	2	-	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE105.4	1	2	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE105		1	2	-	-	-	-	-	-	-	-	1	1	-	-	1

U18CS107 PROGRAMMING FOR PROBLEM SOLVING USING C LAB

Class: B.Tech. I- Semester

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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 C Lab Manual, Dept. of CSE, KITSW.

Reference Books:

1. E. Balagurusamy, Programming in ANSIC, 6th ed, New Delhi: Tata McGraw Hill, 2012
2. Kernighan and Ritchie, The C Programming Language, 2nd ed, New Delhi: Prentice Hall of India, 1988
3. Yaswanth Khanetkar, Let Us C, 13th Ed. Bangalore: BPB Publications, 2012

Course Learning Outcomes (COs):

After 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		P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PS03
CO1	U18CS107.1	1	1	1	1	-	-	-	1	1	1	-	1	2	1	1
CO2	U18CS107.2	1	2	2	1	-	-	-	-	1	1	-	1	2	2	2
CO3	U18CS107.3	1	2	2	1	-	-	-	-	1	1	-	1	2	2	2
CO4	U18CS107.4	1	2	2	2	1	-	-	-	1	1	-	1	2	2	2
U18CS107		1	1.75	2.25	1.25	1	-	-	1	1	1	-	1	2	1.75	1.75

U18CH108 ENGINEERING CHEMISTRY LABORATORY

Class: B.Tech. I -Semester

B.Tech. II -Semester

Branch(s): CE, EEE, ECE, ECI, CSAIML, DS

ME, CSE, CSN, IT, CSIoT

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 EXPERMENTS

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): U18CH108 ENGINEERING CHEMISTRY LABORATORY															
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	U18CH108.1	2	-	1	3	-	1	2	-	2	-	-	-	-	-
C02	U18CH108.2	2	-	1	3	-	-	2	-	2	-	-	-	-	-
C03	U18CH108.3	2	-	1	3	-	-	3	-	2	-	-	-	-	-
C04	U18CH108.4	2	-	1	3	-	-	1	-	2	-	-	-	-	-
U18CH108		2	-	1	3	-	1	2	-	2	-	-	-	-	-

U18CH109 ENVIRONMENTAL STUDIES

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

Branch(s):CE, EEE, ECE, ECI,CSAIME, DS
ME, CSE, CSN, IT, CSIoT

Teaching Scheme

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal	40 marks
End Semester	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*, 3rd 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 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): U18CH109 ENVIRONMENTAL STUDIES															
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	U18CH109.1	2	1	2	1	-	2	1	-	1	-	-	-		
CO2	U18CH109.2	-	-	2	-	-	1	2	-	1	-	-	-		
CO3	U18CH109.3	1	2	1	-	-	1	1	1	1	-	-	-		
CO4	U18CH109.4	-	-	1	-	-	1	2	-	1	-	-	-		
U18CH109		1.5		1.5	1	-	1.25	1.5	1	1	-	-	-		

U18EA110 EAA: SPORTS/YOGA/NSS

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

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

Teaching Scheme :

L	T	P	C
-	-	-	-

Examination Scheme :

Continuous Internal Evaluation	
End Semester Exam	

I. SPORTS

Course Learning objectives (LOs):

The objectives of the Sports is to..

LO1: to perform and engage in a variety of physical activities

LO2 : to develop and maintain physical health and fitness through regular participation in physical activities

LO3: to demonstrate positive self esteem, mental health and physiological balance through body awareness and control

LO4 : to exhibit the spirit of fair play, team work and sportsmanship

Activities related to:

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning objectives (LOs):

The objectives of the NSS is to..

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):

After 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

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : B.Tech. - CE / EEE / ECE / ECI / CSE (AI&ML), DS (Stream - II)

SEMESTER : SECOND

Sl. No	Course Category	Course Code	Course Name	Periods/week			Credits	Evaluation Scheme				Total Marks
				L	T	P		TA	MSE	Total	ESE	
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	U18PH203	Engineering Physics	3	1	-	4	10	30	40	60	100
4	HSMC	U18MH204	English for Communication	2	-	2	3	10	30	40	60	100
5	ESC	U18EE205	Basic Electrical Engineering	3	1	-	4	10	30	40	60	100
6	ESC	U18EE206	Basic Electrical Engineering Laboratory	-	-	2	1	40	-	40	60	100
7	ESC	U18CS207R1	Data Structures through C Laboratory	-	-	2	1	40	-	40	60	100
8	ESC	U18PH208	Engineering Physics Laboratory	-	-	2	1	40	-	40	60	100
9	ESC	U18ME209	Workshop Practice	-	-	2	1	40	-	40	60	100
10	MC	U18EA210	EAA* : Sports/Yoga/NSS	-	-	2	-	100	-	100	-	100
Total				14	3	12	22	310	150	460	540	1000

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment;

MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

* indicates mandatory non-credit course

Student Contact Hours / Week : 29 (periods/week)

Total Credits (C) : 22 Credits

U18MH201 ENGINEERING MATHEMATICS- II

Class: B.Tech. II-Semester

Branch(s): ME, CSE, IT, CSN, CSIoT
CE, EEE, ECE, ECI,CSAIML, DS

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 Gamma 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 Wiley & 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 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 correlate these with applications of Green, Stoke and Gauss divergence theorems

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

CO		P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
C01	U18MH201.1	3	2	1	--	--	--	--	--	--	--	--	1	-	-
C02	U18MH201.2	3	3	2	--	--	--	--	--	--	--	--	-	-	-
C03	U18MH201.3	3	2	2	--	--	--	--	--	--	--	--	1	-	-
C04	U18MH201.4	3	2	2	--	--	--	--	--	--	--	--	-	-	-
U18MH201		3	2.25	1.75	--	--	--	--	--	--	--	--	1		

U18CS202R1 DATA STRUCTURES THROUGH C

Class: B. Tech II-Semester

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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

L01: fundamental data structures and their usage with arrays

L02: representing the linear data structures with stacks and queues

L03: arranging the data using various sorting techniques and representing the data using linked lists

L04: representing non-linear data structures with trees and graphs

UNIT – I (9)

Introduction to Data Structures: Basic terminology, classification of data structures, operations on data structures

Arrays: Operations on arrays-traversing an array, inserting an element in an array, deleting an element from an array, searching an element using binary search

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

UNIT – II (9)

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

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

UNIT - III (9)

Linked Lists: Basic terminologies, linked list versus arrays, memory allocation and deallocation for a linked list, singly linked list operations- traversing, searching, inserting, deleting, reversing; representing stack and queue using linked list

Sorting Techniques: bubble sort, selection sort, quick sort

UNIT – IV (9)

(Concepts and algorithms only)

Trees: Introduction, types of trees. **Binary Tree:** Creating a binary tree, traversing a binary tree- preorder, inorder, postorder recursive traversals.

Binary Search Tree: Operations- searching for a node in binary search tree, inserting an element into binary search tree.

Graphs: Introduction, graph terminology, representation of graphs, graphs traversal methods- breadth first search, depth first search

Text Book:

1. Reema Thareja, Data Structures Using C, 2nd ed. Hyderabad: Oxford University Press, 2014.

Reference Books:

1. E.Balagurusamy, Programming in ANSI-C, 6th ed. Tata McGraw Hill, 2012.
2. Debasis Samanta, Classic Data Structures, 2nd ed. New Delhi: Prentice Hall India, 2009.
3. E Balagurusamy, Data Structure Using C, New Delhi: McGraw Hill Education, 2017.
4. Richard F. Gilberg and Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with 2nd ed. Singapor: Cengage Learning, 2007.

Course Learning Outcomes(COs):

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

CO1: implement programs using static & dynamic arrays

CO2: apply the linear data structures with stacks and queue

CO3: arrange the data with the help of various sorting techniques and linked lists

CO4: organize the data using non-linear data structures with trees and graphs

Course Articulation Matrix (CAM): U18CS202R1 DATA STRUCTURES THROUGH C															
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1 U18CS202R1.1	1	1	-	-	-	-	-	-	-	1	-	1	2	1	1
CO2 U18CS202R1.2	1	2	2	2	-	-	-	-	-	1	-	1	2	2	2
CO3 U18CS202R1.3	1	2	2	2	-	-	-	-	-	1	-	1	2	2	2
CO4 U18CS202R1.4	1	2	2	2	1	-	-	-	-	1	1	1	2	2	2
U18CS202R1	1	1.75	2	2	1	-	-	-	-	1	1	1	2	1.75	1.75

U18PH203 ENGINEERING PHYSICS

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

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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 CO₂ 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 Learning Outcomes (COs):

After 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): U18PH203 ENGINEERING PHYSICS

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	U18PH203.1	2	1	-	-	1	1	-	-	1	-	-	-	-	-
CO2	U18PH203.2	2	1	1	1	-	1	1	-	1	-	-	-	-	-
CO3	U18PH203.3	3	1	1	1	2	1	1	-	1	-	-	-	-	-
CO4	U18PH203.4	3	-	1	1	1	2	1	-	1	-	-	-	-	-
U18PH203		2.5	1	1	1	1.33	1.25	1	-	1	-	-	-	-	-

U18MH204 ENGLISH FOR COMMUNICATION

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

Branch (s): ME, CSE, CSN, IT, CSIo
CE, EEE, ECE, ECI, CSAIML, DS

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 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): U18MH204 ENGLISH FOR COMMUNICATION															
CO		P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
CO1	U18MH204.1	-	1	-	1	1	1	1	1	1	3	2	1		
CO2	U18MH204.2	1	1	-	--	--	--	1	--	3	2	--	3		
CO3	U18MH204.3	-	1	-	--	--	--	--	--	2	2	2	3		
CO4	U18MH204.4	-	1	1	1	--	--	1	--	3	2	1	3		
U18MH204		1	1	1	1	1	1	1	1	2.2	2.25	1.7	2.5		

ENGLISH LANGUAGE LAB

Listening Skills (3×2):

- Listening to Sounds, Stress and Intonation
- Listening for Information

Life Skills (3×2)

- Etiquette
- Goal Setting
- Body Language

Speaking Skills & Writing Skills (6×2)

a. Presentation Techniques:

- 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

U18EE205 BASIC ELECTRICAL ENGINEERING

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

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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

L01: network elements and analysis of simple electrical DC circuits

L02: DC network theorems

L03: fundamentals of 1- and 3- AC circuits

L04: 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 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: U18EE205 BASIC ELECTRICAL ENGINEERING													
CO		PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	U18EE205.1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	U18EE205.2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	U18EE205.3	3	3	1	1	1	-	1	-	-	1	-	-
CO4	U18EE205.4	3	3	1	1	1	1	1	1	-	1	-	-
U18EE205		2.5	2.25	1	1	1	1	1	1	-	1	-	-

U18EE206 BASIC ELECTRICAL ENGINEERING LABORATORY

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

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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): U18EE206 BASIC ELECTRICAL ENGINEERING LABORATORY

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	U18EE206.1	2	2	1	1	1	1	-	-	2	2	1	2
CO2	U18EE206.2	2	1	-	1	-	1	-	-	2	1	1	1
CO3	U18EE206.3	2	2	2	2	1	1	1	-	2	1	2	1
CO4	U18EE206.4	2	1	1	2	1	1	1	-	2	1	1	1
U18EE206		2	1.5	1.33	1.5	1	1	1	-	2	1.25	1.25	1.25

U18CS207R1 DATA STRUCTURES THROUGH C LABORATORY

Class: B. Tech II-Semester

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

List of Experiments

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: different types of sorting techniques

LO4: memory and data management using linked list

Experiment-I

1. Program to implement initialization of array and traversal operation
2. Program to implement insertion operation on array

Experiment-II

3. Program to implement searching operations on array
4. Program to implement deletion operations on array

Experiment-III

5. Program to display the count of occurrences of every number in an array
6. Program to represent and display the sparse matrix

Experiment-IV

7. Program to implement initialization of arrays and traversal operation with DMA
8. Program to implement matrix addition and subtraction with DMA

Experiment-V

9. Program to implement matrix multiplication with DMA
10. Program to implement stack operations

Experiment-VI

11. Program to convert infix expression into postfix
12. Program to evaluate given postfix expression

Experiment-VII

13. Program to implement queue operations using arrays

Experiment-VIII

14. Program to create single linked list and implement its operations
i) insert ii) traversal iii) search

Experiment-IX

15. Program to create single linked list and implement its operations
i) delete ii) reversal

Experiment-X

16. Program to implement stack operations using linked list
17. Program to implement queue operations using linked list

Experiment-XI

18. Program to implement bubble sort
19. Program to implement selection sort

Experiment-XII

20. Program to implement quick sort

Laboratory Manual:

1. 'Data Structures Using C' laboratory manual, Dept. of CSE, KITSW.

Reference Books:

1. Reema Thareja, Data Structures Using C, 2nd ed. Hyderabad: Oxford University Press, 2014.
2. E. Balagurusamy, Programming in ANSI-C, 6th ed. Tata McGraw Hill, 2012.
3. Richard F. Gilberg and Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, 2nd ed. Singapore: Cengage Learning, 2007.

Course Learning Outcomes (COs):

After completion of this course, students will be able to,

CO1: implement the fundamental data structures using C-language

CO2: develop Course Learning Objectives (LOs):

CO3: implement programs for arranging the data using various sorting techniques

CO4: develop program using linked representation

Course Articulation Matrix (CAM):U18CS207R1 DATA STRUCTURES THROUGH C LABORATORY																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	U18CS207R1.1	1	1	-	-	-	-	-	-	1	1	-	1	2	2	2
CO2	U18CS207R1.2	1	2	2	2	-	-	-	-	1	1	-	1	2	2	2
CO3	U18CS207R1.3	1	2	2	2	-	-	-	-	1	1	-	1	2	2	2
CO4	U18CS207R1.4	1	2	2	2	1	-	-	-	1	1	1	1	2	2	2
U18CS207R1		1	1.75	2	2	1	-	-	-	1	1	1	1	2	2	2

U18PH208 ENGINEERING PHYSICS LABORATORY

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

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

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):

After completion of this course, 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): U18PH208 ENGINEERING PHYSICS LABORATORY															
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	U18PH208.1	1	-	-	3	-	-	2	-	2	-	-	-	-	-
CO2	U18PH208.2	1	-	-	3	-	-	2	-	2	-	-	-	-	-
CO3	U18PH208.3	1	-	-	3	-	-	2	-	2	-	-	-	-	-
CO4	U18PH208.4	2	-	1	3	-	-	2	-	2	-	-	-	-	-
U18PH208		1.25	-	1	3	-	-	2	-	2	-	-	-	-	-

U18ME209 WORKSHOP PRACTICE

Class: B. Tech. I & II Semesters

Branch(s): ME, CSE, CSN, IT, CSIoT, CE, EEE, ECE, ECI, CSAIML, DS

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: 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:

- [1] Workshop Practice Manual, Dept. of ME, KITSW.

Reference Book:

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

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): U18ME209 WORKSHOP PRACTICE													
	CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	U18ME209.1	2	1	1	-	-	1	-	-	-	1	-	1
CO2	U18ME209.2	2	1	1	-	-	1	-	-	-	1	-	1
CO3	U18ME209.3	2	1	1	-	-	1	-	-	-	1	-	1
CO4	U18ME209.4	2	1	1	-	-	1	-	-	-	1	-	1
U18ME209		2	1	1	-	-	1	-	-	-	1	-	1

U18EA210 EAA: SPORTS/YOGA/NSS

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

Branch(s): ME, CSE, CSN, IT, CSIoT
CE, EEE, ECE, ECI, CSAIML, DS

Teaching Scheme :

L	T	P	C
-	-	-	-

Examination Scheme :

Continuous Internal Evaluation	
End Semester Exam	

I. SPORTS

Course Learning objectives (LOs):

The objectives of the Sports is to..

LO1: to perform and engage in a variety of physical activities

LO2 : to develop and maintain physical health and fitness through regular participation in physical activities

LO3: to demonstrate positive self esteem, mental health and physiological balance through body awareness and control

LO4 : to exhibit the spirit of fair play, team work and sportsmanship

Activities related to:

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning objectives (LOs):

The objectives of the NSS is to..

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):

After 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



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL
(An Autonomous Institute under Kakatiya University, Warangal)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
III SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

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	U18MH301	Engineering Mathematics - III	3	1	-	4		10	30	40	60	100
2	HSMC	U18TP302	Soft & Interpersonal Skills	-	-	2	1		100	-	100	-	100
3	OE	U18OE303	Open Elective-I	3	-	-	3		10	30	40	60	100
4	PCC	U18CE304	Fluid Mechanics	3	-	-	3		10	30	40	60	100
5	PCC	U18CE305	Surveying	3	-	-	3		10	30	40	60	100
6	PCC	U18CE306	Construction Materials	3	-	-	3		10	30	40	60	100
7	PCC	U18CE307	Concrete Technology Laboratory	-	-	2	1		40	-	40	60	100
8	PCC	U18CE308	Surveying Field Work-I	-	-	2	1		40	-	40	60	100
9	OE	U18OE311	Open Elective-I based Laboratory	-	-	2	1		40	-	40	60	100
Total				15	1	8	20		270	150	420	480	900

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] Stream-I CSE,IT,ME Stream-II EEE, ECE, EIE,CE

Total Contact Periods/Week:24

Total Credits :20

Open Elective-I: U18OE303A: Object Oriented Programming (CSE) U18OE303B: Fluid Mechanics & Hydraulic Machines (CE) U18OE303C: Mechatronics (ME) U18OE303D: Web Programming (IT) U18OE303E: Microprocessors (ECE) U18OE303F: Strength of Materials (CE)	Open Elective-I based Lab: U18OE311A: Object Oriented Programming Lab (CSE) U18OE311B: Fluid Mechanics & Hydraulic Machines Lab (CE) U18OE311C: Mechatronics Lab (ME) U18OE311D: Web Programming Lab (IT) U18OE311E: Microprocessors Lab (ECE) U18OE311F: Strength of Materials Lab(CE)
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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 in engineering

LO2: Fourier series and its application to solve engineering problems

LO3: Functions of complex variables, the property of analyticity of a function of complex variable and their applications

LO4: integration of a function of complex variable, 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 orthonormal 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 Books:

1. Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers, Delhi, 43/e, 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, New York, 9/e, 2013.

Course Learning Outcomes (COs):

Course Learning Outcomes (COs):

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

CO1: 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

CO3: construct analytic function; find velocity potential and stream function of a fluid flow using complex analytical methods

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

Course Articulation Matrix: U18MH301 ENGINEERING MATHEMATICS- III																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18MH 301.1	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301.2	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301.3	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301.4	2	1	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301	2	1.75	--	--	--	--	--	--	--	--	--	1	2	--	--	1

U18TP302**SOFT AND INTERPERSONALSKILLS****Class:** B.Tech III semester**Branch:** ME, CSE, IT**Teaching Scheme:**

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

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

LO1: analyzing self and learning to overcome possible threats

LO2: group dynamics to demonstrate respect for the opinions and beliefs of group

LO3: effective presentations using visual aids and analyzing the videos

LO4: communicating professionally, making resume in line with industry expectations

LIST OF ACTIVITIES**Introduction**

Activity 1	Team interaction
Activity 2	SWOT analysis
Activity 3	Debate
Activity 4	Group Discussion

Activity 5	Presentations through PPTs
Activity 6	Video Synthesis
Activity 7	Resume Writing
Activity 8	Email Etiquette

Activity9 : My interview Plan: Self Introduction & FAQs } Comprehensive Presentation
Activity10 : "My Career Plan" Oral presentation }

Text Books:

- Developing Communications Skills – Krishna Mohan & Meera Benerji, Mcmillan Publications, New Delhi, 2005
- Soft Skills - Alex.K, S. Chand Publications, New Delhi, 2010
- Soft skills Cornerstone of Professional success – Raman & Meenakshi, Jain Brothers Publications, New Delhi, 2009

References:

- https://onlinecourses.nptel.ac.in/noc19_hs20/preview
- https://onlinecourses.nptel.ac.in/noc18_hs30/preview

Course Learning Outcomes (COs):

Upon completion of this course, the student 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 :U18TP302 SOFT AND INTERPERSONAL SKILLS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18TP302.1	-	-	-	-	-	-	-	-	2	3	-	-	-	-	1	1
U18TP302.2	-	-	-	-	-	-	-	2	3	3	-	-	-	-	1	1
U18TP302.3	-	-	-	-	-	-	-	-	2	3	-	-	-	-	1	1
U18TP302.4	-	-	-	-	-	-	-	1	2	3	-	-	-	-	1	1
U18TP302	-	-	-	-	-	-	-	1.5	2.25	3	-	-	-	-	1	1

U18OE303A OBJECT ORIENTED PROGRAMMING

Class: B. Tech III-Semester

Branch: Computer Science & Engineering

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 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:

1. P Radha Krishna, "Object Oriented Programming through JAVA", Universities Press, ISBN: 9788173715723,2011.
2. Herbert Schildt, "JAVA The Complete Reference", McGraw-Hill Education India Pvt.Ltd , 9th Edition, ISBN: 9781259002465,2011.
3. Kathy Sierra, Bert Bates, "Head First Java", O'Reilly Publications, 2nd Edition, ISBN-13:978-0596009205.
4. UttamK.Roy, "Advanced JAVA Programming", Oxford Publications; First edition, ISBN-13: 978- 0199455508.

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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 : U18OE303A OBJECT ORIENTED PROGRAMMING

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE303A.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303A.2	2	2	2	1	2	1	-	-	2	1	2	1	1	-	-	1
U18OE303A.3	2	2	2	1	2	1	-	-	2	1	2	1	1	-	-	1
U18OE303A.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE303A	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1

U18OE303B FLUID MECHANICS AND HYDRAULIC MACHINES

Class: B.Tech.III-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, Piezometer, U-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, buoyancy, metacenter, 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, venturimeter, orificemeter, pitottube, 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, 21stedn., 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, 9th edn., 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 Learning Outcomes (Cos):

Upon completion of this course, the student 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.

Course Articulation Matrix:U18OE303B Fluid Mechanics and Hydraulic Machines																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE303B.1	2	1	-	-	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.2	2	1	-	1	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.3	2	1	-	1	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.4	2	1	-	1	-	1	-	-	1	1	-	1	2	-	1	2
U18CE303B	2	1	-	1	-	1	-	-	1	1	-	1	2	-	1	1.25

U18OE303C MECHATRONICS

Class: B.Tech.III-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 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. NitaigourPremchandMahalik, 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. DevdasShetty, Richard and Kil, Mechatronics System and Design, *Cenage Learning*, Inc. 2/e, ISBN- 13: 978-1439061985,2010.

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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

Course Articulation Matrix : U18OE303C MECHATRONICS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE303C.1	2	2	1	-	2	2	-	-	-	1	-	1	1	-	-	1
U18OE303C.2	2	2	1	-	2	-	-	-	-	1	-	1	1	-	-	1
U18OE303C.3	2	2	1	3	2	-	-	-	-	1	-	1	1	-	-	1
U18OE303C.4	2	2	1	1	2	-	-	-	-	1	-	1	1	-	-	1
U18OE303C	2	2	1	2	2	2	-	-	-	1	-	1	1	-	-	1

U18OE303D WEB PROGRAMMING

Class: B.Tech.III-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 DriverManager, 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 My SQL: 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", 7th Edition, 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", 3rd Edition, Sams Publications, ISBN: 0-672-32672-8, 2005
4. Jayson Falkner, Kevin Jones, "Servlets and Java Server Pages", 1st Edition, Pearson, ISBN: 0-321-13649-7, 2003

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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 :U18OE303D WEB PROGRAMMING

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
U18OE303D.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303D.2	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303D.3	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303D.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE303D	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1

U18OE303E MICROPROCESSORS

Class: B.Tech., III-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:

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, 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 Learning Outcomes (Cos):

Upon completion of this course, the student 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 its standards

Course Articulation Matrix:U18OE303E MICRO PROCESSORS																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE 303E.1	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 303E.2	3	2	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 303E.3	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 303E.4	3	3	2	1	--	--	--	--	--	--	--	1	1	-	-	1
U18OE 303E	3	2.75	2	1	--	--	--	--	--	--	--	1	1	-	-	1

U18OE303F STRENGTH OF MATERIALS

Class: B.Tech. III -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: behaviour 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: behaviour 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 moduli: 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. and Mudimby Andal, "Strength of Materials", 1st edn. 2018, Cambridge University Press.

Reference Books:

1. Timoshenko and Gere, "Mechanics of Materials", 1st Edition McGraw 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 Learning Outcomes (Cos):

Upon completion of this course, the student 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: U18OE303 Strength of Materials

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE303F.1	2	2	1	1	-	-	-	-	-	1	-	2	2	1	-	1
U18CE303F.2	2	2	1	-	-	-	-	-	-	1	-	1	2	1	-	1
U18CE303F.3	2	2	1	1	-	-	-	-	-	-	-	1	2	1	-	1
U18CE303F.4	2	2	1	2	-	-	-	-	-	1	-	1	2	1	-	1
U18CE303F	2	2	1	1.33	-	-	-	-	-	1	-	1.25	2	1	-	1

U18CE304 FLUID MECHANICS

Class: B.Tech. III-Semester

Branch: Civil Engineering

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 fluid properties, pressure measurement and stability of floating bodies

LO2: summarizing various fluid flows and apply Bernoulli's equation

LO3: dimensional analysis, similitude studies and model laws

LO4: flow through pipes and analysis of laminar flow

UNIT-I(9)

Fluid fundamentals: Introduction, conservation principles applied in fluid mechanics, ideal fluid and real fluid, fluid continuum, fluid properties, density, specific weight, specific gravity, specific volume, viscosity, capillarity, vapour pressure, compressibility, surface tension, cohesion and adhesion.

Fluid statics: Pascal's Law, hydrostatic Law, measurement of pressure, atmospheric pressure, gauge pressure, absolute pressure, principle of manometers, piezometer, u-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, total pressure and centre of pressure, buoyancy and floatation, metacentre, stability of floating and submerged bodies.

UNIT-II (9)

Fluid kinematics: Classification of fluid flow, steady and unsteady flow, uniform and non-uniform flow, one, two and three dimensional flows, laminar and turbulent flow, rotational and irrotational flow, streamline, path line, streak line, stream tube, acceleration of fluid particle, continuity equation in one, two and three dimensional flows, velocity potential and stream function.

Fluid dynamics: Forces causing motion, Euler's equation of motion, Bernoulli's equation, applications of Bernoulli's theorem, venturimeter, orificemeter, orifice, mouthpiece, notches, weirs and Pitot tube, linear momentum equation, application of linear momentum equation to pipe bends.

UNIT-III(9)

Dimensional analysis: Dimension of various physical quantities and dimensional homogeneity, dimensional analysis by Rayleigh's method and Buckingham's π theorem, dimensionless numbers and their consequences in fluid mechanics.

Model analysis: Forces influencing hydraulic phenomena, types of similarities, model analysis, similitude studies, modeling, classification of models, Reynold's and Froude's model laws.

UNIT-IV (9)

Flow through pipes: Major and minor losses in a pipe, expressions for head loss, hydraulic gradient line, total energy line, pipes in series and parallel, equivalent pipe, power transmission through pipes.

Laminar flow: Characteristics of laminar flow, Reynold's experiment, critical Reynold's number, critical velocity, steady laminar flow through a circular pipe, Hagen Poiseuille equation.

Text Books:

1. P. N. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics Including Hydraulic Machines", Standard Book House, Raj sons Publications Private Limited, 21st edn., 2017
2. A. K. Jain, "Fluid Mechanics Including Hydraulic Machines", Khanna Publications, 12th edn., 2018.

Reference Books:

1. L. Victor Streeter and E. Benjamin Wylie, "Fluid Mechanics", McGraw Hill, Singapore, 9th edn., 2017.
2. M. Frank White, "Fluid Mechanics", Tata McGraw Hill, New Delhi, Special Indian edn., 2011.
3. K. Subramanya, "Theory and Applications of Fluid Mechanics" Tata McGraw Hill, 1993
4. C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, "Fluid Mechanics and Machinery" Oxford University Press, 2010

Course Learning Outcomes (Cos):

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

CO1: summarize fluid properties using fundamental laws of fluid statics.

CO2: identify various types of fluid flows and determine discharge using Bernoulli's equation.

CO3: analyse hydraulic phenomena using model laws with the help of dimensional principles.

CO4: estimate the major and minor losses in pipes and summarize laminar flow

Course Articulation Matrix :U18CE304 Fluid Mechanics																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE304.1	2	1	1	-	1	-	-	-	1	-	-	1	1	-	-	1
U18CE304.2	2	1	2	1	1	1	-	-	2	-	-	1	1	-	-	1
U18CE304.3	2	1	2	1	1	-	-	-	2	-	-	1	1	-	-	1
U18CE304.4	2	1	1	1	1	1	-	-	1	-	-	1	1	-	-	2
U18CE304	2	1	1.5	1	1	1	-	-	1.5	-	-	1	1	-	-	1.25

U18CE305 SURVEYING

Class: B.Tech. III-Semester

Branch: Civil Engineering

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: basic principles of chain, tape and theodolite

LO2: concepts of levelling, contouring, computation of areas and volumes

LO3: concepts of tacheometry, trigonometric survey and setting out curves.

LO4: interpreting surveying data using photogrammetry, RS and GIS, total station and GPS.

UNIT-I(9)

Basics of surveying: Principles of surveying, types of chain and tape, tape corrections, chaining, ranging on levelling and sloping ground, types of compass, bearings, magnetic declination, and local attraction.

Theodolite and traverse surveying: Temporary and permanent adjustments, measurement of angles, fundamental lines and relations, traverse methods and computations, balancing traverse.

UNIT-II (9)

Levelling and contouring: Definitions, Terms and Abbreviations, methods of levelling, differential, profile, cross section levelling, characteristics of contours, methods of contouring, interpolation of contours, contour gradient, uses of contour maps.

Areas and volumes: Areas computed by sub division into triangles, from offsets to baseline, calculations of volumes for same level sections, by prismoidal and trapezoidal formula, volume from spot levels, capacity of reservoir.

UNIT-III (9)

Tacheometry and trigonometric surveying: Introduction to tacheometry, types of tacheometric measurements, determination of tacheometric constants, distance and elevation formulae and uses of tacheometric survey, trigonometric survey with accessible and inaccessible bases.

Curves: Theory of simple curves, setting out simple curves by linear methods and Rankine's deflection angle method, setting out compound, transition curves with basic data of chainage radius and deflection angles, necessity and advantages of transition curve.

UNIT-IV (9)

Photogrammetry and RS&GIS: Introduction to photogrammetry, types of photographs, scale of vertical photograph, relief displacement, Introduction and process of remote sensing, types of platforms, sensors and applications, GIS introduction, components, data types, functionalities of GIS.

Advanced surveying instruments: Introduction and features of total station, setting up and orienting, capabilities and advantages of total station, GPS Introduction, segments, uses, applications.

Text Books:

1. S.K. Duggal, "Surveying Volume I and II", McGraw Hill Education (India) Pvt. Ltd, 2013.
2. B.C. Punmia & Ashok Kumar Jain, "Surveying Volume I, II and III", Laxmi Publications, 17th edn., 2016.

Reference Books:

1. K.R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.
2. T.P. Kanetkar and S.V. Kulkarni, "Surveying and Levelling Volume I and II", Pune Vidyarthi Griha Prakashan, 24th edn., 2014.
3. R. Subramanian, "Surveying and Levelling", Oxford University Press, New Delhi, 2nd edn., 2007.
4. R. Agor, "A Textbook of Surveying and Levelling", Khanna Publisher, 12th edn., 2016.

Course Learning Outcomes (Cos):

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

CO1: summarize the basic principles of chain, tape and theodolite.

CO2: apply the concepts of levelling, contouring and estimate the areas, volumes.

CO3: Apply tachometry, trigonometric leveling methods and set out curves..

CO4: explain the use of modern surveying tools and instruments.

Course Articulation Matrix: U18CE305 SURVEYING																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CE305.1	2	1	-	-	-	1	-	-	1	-	-	1	2	-	2	1
CE305.2	2	2	1	-	-	1	-	-	2	-	-	1	2	-	2	1
CE305.3	2	2	1	-	-	1	-	-	2	-	-	1	2	-	2	1
CE305.4	2	1	-	-	1	-	-	-	-	-	-	1	2	-	2	1
U18CE305	2	1.5	1	-	1	1	-	-	1.7	-	-	1	2	-	2	1

U18CE306 CONSTRUCTION MATERIALS

Class: B.Tech. III-Semester

Branch: Civil Engineering

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 of construction materials, brick and stone masonry.

LO2: different concrete making materials and properties of fresh, hardened concrete.

LO3: various phases in production of concrete and methods of proportioning concrete.

LO4: properties of other important construction materials.

UNIT-I(9)

Stone masonry: Classification, qualities of good building stone, types of stone masonry constructions, tests on building stones, IS codal provisions of stone masonry.

Building materials and brick masonry: Introduction to construction materials, engineering properties of construction materials, composition and classification of bricks, stretcher and headercourse, bonds in brick work, english, flemish bonds, clay bricks, flyash bricks, CLC bricks, AAC bricks, tests on bricks, IScodal provisions..

UNIT-II (9)

Concrete making materials: Concrete making materials, cement, oxide and compound composition of OPC, types and grades of cements, properties of cement, tests on cement, classification of aggregates, characteristics of aggregates, grading, tests on aggregates, water quality for construction, admixtures for concrete.

Properties of fresh and hardened concrete: Workability of fresh concrete, factors affecting workability, tests on workability, segregation and bleeding, strengths of concrete, factors affecting strength of concrete, stress-strain characteristics, shrinkage and creep, permeability, durability, acid attack, efflorescence, fire resistance, thermal properties.

UNIT-III(9)

Production of concrete: Phases in production of concrete, batching, mixing, transportation, placing, methods of compaction, finishing of concrete, methods of curing.

Proportioning of concrete: Factors influencing concrete mix design, methods of concrete mix design, IS-Code method, ACI method.

UNIT-IV (9)

Timber and plastics: Structure of timber, suitability of timber, defects of timber, commonly used timber in construction, seasoning, preservation, classification of plastics, thermoplastics and thermosetting plastics, moulding compounds, properties of plastics, use of PVC in civil engineering construction, IS codal provisions.

Steel, glass and bitumen: Types of steel, properties, applications, forms of steel, defects, corrosion, preventive measures, composition and properties of glass, types and applications of bitumen, IS codal provisions.

Text Books:

1. B. C. Punmia, "Building construction", Laxmi Publications Pvt., Ltd., New Delhi, 19thEdn. 2005.
2. M. S. Shetty, A. K. Jain "Concrete Technology (Theory of Practice)", S. Chand Company, New Delhi, 08thedn.,2019.

Reference Books:

1. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill, New Delhi, 05thEdn.2013.
2. S. P. Arora and Bindra, " A Textbook of Building Constructions", Dhanpat Rai and Sons, 4thEdn.,2010
3. S. K. Duggal, "Building materials", New Age International Pvt., Ltd., New Delhi
4. S.C.Rangwala, K.S.Rangwala and P.S.Rangwala, "Engineering Materials", Charotar Publishers,feb.2019
5. A. R. Santha Kumar "Concrete Technology", Oxford Publishers,1stEdn.,2010.
6. IS 10262 (2009): Guidelines for concrete mix designproportioning.
7. IS383 (1970): Specification for Coarse and Fine Aggregates from natural sources forconcrete.
8. IS 1077 (1992): Common Burnt Clay BuildingBricks.

Course Learning Outcomes (Cos):

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

CO1: describe properties of building materials, brick and stone masonry.

CO2: summarize constituents of concrete and its properties in fresh, hardened state.

CO3: explain various phases in production of concrete and concrete mix designs using IS, ACI method.

CO4: illustrate subsidiary materials for civil engineering applications.

Course Articulation Matrix: U18CE306 CONSTRUCTION MATERIALS																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE306.1	2	-	-	-	-	1	-	-	-	-	-	2	2	-	2	1
U18CE306.2	2	-	-	-	-	-	-	-	-	-	-	2	2	-	2	1
U18CE306.3	2	2	1	-	-	-	-	-	-	-	-	2	2	2	2	1
U18CE306.4	2	-	-	-	-	1	1	-	-	-	-	2	2	-	2	1
U18CE306	2	2	1	-	-	1	1	-	-	-	-	2	2	2	2	1

U18CE307 CONCRETE TECHNOLOGY LABORATORY

Class: B.Tech.III-Semester

Branch: Civil 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 students' knowledge in /on

LO1: testing of bricks

LO2: testing of cement

LO3: testing of fine aggregates and coarse aggregates

LO4: testing of fresh and hardened concrete

LIST OF EXPERIMENTS

1. Determination of compressive strength of bricks (clay and fly ash)
2. Determination of water absorption test on bricks
3. Determination of fineness and specific gravity of cement
4. Determination of standard consistency of cement
5. Determination of initial and final setting times of cement
6. Determination of compressive strength of cement
7. Determination of fineness modulus of fine and coarse aggregates
8. Determination of bulk density, specific gravity, porosity and void ratio of fine and coarse aggregates
9. Determination of bulking of fine aggregate
10. Determination of workability of fresh concrete
11. Determination of compressive strength of concrete
12. Determination of split tensile strength of concrete
13. Determination of modulus of rupture of concrete
14. Demonstration on non- destructive evaluation of concrete

Laboratory manual:

1. "Concrete technology laboratory" manual prepared by the faculty of Civil Engineering, KITSW

Reference Books:

1. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill, New Delhi, 5thedn.2013.
2. M. S. Shetty, Ak.Jain "Concrete Technology (Theory and Practice)", S. Chand Company, New Delhi, 8thedn., 2019.
3. A. R. Santha Kumar, "Concrete Technology", Oxford Publishers, 1stedn.2010.
4. A. M. Neville, "Properties of Concrete", McGrawHill Publications, New Delhi, 5thedn.2012.

Course Learning Outcomes (Cos):

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

CO1: bricks

CO2: cement

CO3: fine and coarse aggregates

CO4: fresh and hardened concrete

Course Articulation Matrix: U18CE30 CONCRETE TECHNOLOGY LABORATORY

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE307.1	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307.2	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307.3	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307.4	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2

U18CE308 SURVEYING FIELD WORK – I

Class: B.Tech. III-Semester

Branch: Civil 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 students' knowledge in /on

LO1: chain surveying

LO2: measuring the angles between survey lines

LO3: methods of Leveling

LO4: Develop contour map of an area and Longitudinal section, Cross section of given project

LIST OF EXPERIMENTS

1. Chain surveying: use of optical square or cross staff, check line, tie line
2. Horizontal angle measurement by repetition and re-iteration methods
3. Measuring the distance between two inaccessible points using theodolite
4. Theodolite traversing- closed traverse
5. Theodolite traversing for omitted measurements (bearing/ length /both of one side omitted)
6. Levelling – temporary adjustments and recording staff readings
7. Fly levelling using auto level
8. Profile levelling using autolevel
9. Longitudinal and cross section exercises
10. Block levelling using theodolite
11. Trigonometric levelling – single plane method
12. Trigonometric levelling – double plane method

Laboratory Manual:

1. Survey Field Work – I Lab manual, prepared by faculty of Civil Engineering, KITSW

Reference Books:

1. B.C. Punmia and Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publication, Pvt., Ltd 16th edn., 2011
2. K.R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.

Course Learning Outcomes (Cos):

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

CO1: conduct chain surveying to measure linear distances and calculate areas

CO2: establish the survey lines by measuring angles using theodolite

CO3: determine the reduced levels of points using auto level.

CO4: prepare contour map of an area and sketch longitudinal, cross sectional details.

Course Articulation Matrix :U18CE308 Surveying fieldwork-I

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CE308.1	2	1	1	-	-	1	-	-	2	-	-	1	2	-	1	1
CE308.2	2	2	1	-	-	1	-	-	2	-	-	1	2	-	1	1
CE308.3	2	2	1	-	-	1	-	-	2	-	-	1	2	-	1	1
CE308.4	2	2	1	-	-	1	-	-	2	-	-	2	2	-	1	1
U18CE308	2	1.75	1	-	-	1	-	-	2	-	-	1.25	2	-	1	1

U18OE311A OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B. Tech III-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 (LO):

This course will develop students' 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

1. Write a program to demonstrate loop control statements.
2. Write a program to demonstrate for-each control loop.
3. Implement programs using single dimensional arrays.
4. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment -III

1. Write a program to demonstrate creating object to a class for accessing variables and methods.
2. Write a program to demonstrate creating multiple object.
3. Write a program to demonstrate passing objects to methods.
4. Write a program to demonstrate constructors 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 *super* 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.*

Text Book:

1. Herbert Schildt, "JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465, 2014.

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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: U18OE311A OBJECT ORIENTED PROGRAMMING LABORATORY																
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE311A.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE311A.2	2	2	2	1	2	1	1	-	2	1	2	1	1	-	-	1
U18OE311A.3	2	2	2	1	2	1	-	-	2	1	2	1	1	-	-	1
U18OE311A.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE311A	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1

U18OE311B FLUID MECHANICS AND HYDRAULIC MACHINESLABORATORY

Class: B.Tech. III-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 students' 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.
Estimation of coefficients of various head losses in pipes due to major and
5. 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., 1stedn., 2008.
2. Sarbjit Singh, "Experiments in Fluid Mechanics", PHI Learning Private Limited, New Delhi, 2009.

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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: U18OE311B Fluid Mechanics And Hydraulic Machines Laboratory																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE311B.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	2
U18OE311B.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	2
U18OE311B.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	2
U18OE311B.4	2	1	-	1	-	-	-	-	1	1	-	1	2	-	-	2
U18OE311B	2	1	-	1	-	-	-	-	1	1	-	1	2	-	-	2

U18OE311C MECHATRONICS LAB

Class: B.Tech. III-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 Outcomes (LOs):

This course will develop students' 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 Learning Outcomes (Cos):

Upon completion of this course, the student 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: U18OE311C MECHATRONICSLAB

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE311C.1	1	2	1	2	-	-	-	-	-	1	-	1	1	-	-	1
U18OE311C.2	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1
U18OE311C.3	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1
U18OE311C.4	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1
U18OE311C	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1

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

L	T	P	C
-	-	3	2

Examination Scheme:

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

Course Learning Objectives:

This course will develop students' knowledge in / on

LO1: implementing HTML Tags, CSS and Java Scripts for creating static web pages.

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**2. HTML**

AIM: Design the following static web pages required for an online book store web site.

- a. **HOME PAGE:**
- b. **LOGIN PAGE**
- c. **CATALOG 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	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

b. LOGIN PAGE: This page looks like below:

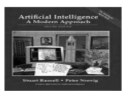
Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submit Reset			

Experiment-3

c. CATALOGUEPAGE:

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	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE		Book : XML Bible Author : Winston Publication : Wiely	\$ 40.5	
ECE		Book : AI Author :S.Russel Publication : Princeton hall	\$ 63	
EEE		Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	
CIVIL		Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	\$ 50	

Experiment-4

3. 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(shouldnotcontainanyinvalidandmustfollowthestandardpattern
(*name@domain.com*)
- d. Phone number (Phone number should contain 10 digits only).
Note: You can also validate the login page with these parameters.

4. 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}
```

5. Embedding JavaScript in HTML pages.
6. Design a registration form and validate its field by using Java Script.

Experiment-5

7. To design the scientific calculator and make event for each button using Java Script.
8. WAP to create popup boxes in Java Script.
9. 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

10. Print current date & time
11. JSP Program to auto refresh a page
12. JSP Program to count no. of visitors on website
13. JSP program for error handling
14. Demonstrate expression tag
15. Detect locale, language settings & local specific time
16. Demonstrate JSP implicit object
17. JSP Program to display given number in words

Experiment-7

18. Display the contents of Employee table in a neat format.
19. Insert *N*, no. of records into Employee table using *Prepared Statement*.
20. Enhance the salaries of Employee by 10% who are earning salary greater than 5000 using *Callable Statement*.
21. Delete all students whose marks are below 50% and also display the count.

Experiment-8

22. 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.
23. Create a JSP Page with and run in JSP Engines.
24. Demonstrate Session Tracking in JSP.
25. JSP Program to validate username and password

Experiment-9

26. Create Database Connectivity with JSP page with different JDBC Drivers.
27. JSP Program to Select record from database
28. JSP Program to Insert a record into the database
29. Create a CRUD operation for JSP Page using My SQL
30. JSP Program to upload file into server

Experiment-10

31. Create a form for your college library entering student details for each student in the college. Validate the form using PHP validators and display error messages.
32. 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

33. 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.
34. Create and delete MYSQL database using PHP.

Experiment-12

35. Create a PHP program to demonstrate opening and closing a file.
36. Create a PHP program to demonstrate reading a file and writing in a file.

Course Learning Outcomes (Cos):

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

CO1: create the static web pages using HTML Tags and CSS and

CO2: design dynamic web page for web applications using JSP

CO3: develop server side scripts for web base applications using PHP

CO4: design web applications for effective storage and retrieval of data in My SQL using PHP.

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P1 0	P1 1	P1 2	PSO 1	PSO 2	PSO 3	PSO 4
U18OE 311 D.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE 311 D.2	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE 311 D.3	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE 311 D.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE 311 D	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1

U18OE311E MICRO PROCESSORS LABORATORY

Class: B.Tech.III-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 (LO):

This Course will develop student's knowledge on/in

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)

- Study of 8086 Trainer Board
- Simple Arithmetic Operations (Addition, Subtraction, Multiplication and Division)
- Finding Sum, Average.
- Largest/Smallest Number in a given array
- Arranging in Ascending/ Descending order
- Finding Factorial using recursive procedure
- Transfer of bytes from DS to ES
- ALPs for String Manipulation
- ALPs for Code conversions
- Wave form Generation using DAC modules
 - Squarewave
 - Sawtoothwave
 - Triangularwave
- ADC interfacing
- Stepper motor -interfacing

Laboratory Manual:

- Microprocessors Laboratory Manual, prepared by the faculty of department of ECE, KITSW.

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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:U18OE311E MICROPROCESSORS LAB																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE 311E.1	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 311E.2	3	2	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 311E.3	3	2	1	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 311E.4	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE311E	3	2.5	1.75	1	--	--	--	--	--	--	--	--	1	-	-	1

U18OE311F STRENGTH OF MATERIALS LABORATORY

Class: B.Tech. III-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 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: codal 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 rebend 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 Books:

1. Harmer E. Davis and George Earl Troxell, "Testing and Inspection of Engineering Materials", McGraw-Hill book company, inc, 2nd edn., 1955.
2. A.V.K. Suryanarayana, "Testing of Metallic Materials", Prentice-Hall of India, 2nd edn., 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.
5. IS 432(Part-II):1982 "Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement". Bureau of Indian standards, New Delhi,2004.

Course Learning Outcomes (Cos):

Upon completion of this course, the student 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:U18OE311F Strength of Materials Laboratory																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE311F.1	1	-	-	1	-	1	-	-	2	1	1	1	1	1	1	1
U18OE311F.2	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1	-
U18OE311F.3	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1	-
U18OE311F.4	1	-	-	1	-	1	-	2	1	1	1	1	1	1	1	1
U18OE311F	1	-	-	1	-	1	-	2	1.75	1	1	1	1	1	1	1



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL
(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
IV SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Estd: 1980
KITSW

URR-18R22

[6Th+3P+1MC]

Sl. No	Category	Course Code	Course Title	Periods/week				Credits	Evaluation scheme				
									CIE			ESE	Total Marks
				L	T	P	C		TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4		10	30	40	60	100
2	HSMC	U18MH402	Professional English	-	-	2	1		100	-	100	-	100
3	PCC	U18CE403	Mechanics of Materials	3	1	-	4		10	30	40	60	100
4	PCC	U18CE404	Hydraulics Engineering	3	-	-	3		10	30	40	60	100
5	PCC	U18CE405	Design of Reinforced Concrete Structures	3	1	-	4		10	30	40	60	100
6	PCC	U18CE406	Engineering Geology	3	-	-	3		10	30	40	60	100
7	PCC	U18CE407	Hydraulic and Hydraulic Machinery Laboratory	-	-	2	1		40	-	40	60	100
8	PCC	U18CE408	Engineering Geology Laboratory	-	-	2	1		40	-	40	60	100
9	PCC	U18CE409	Surveying Field Work-II	-	-	2	1		40	-	40	60	100
10	MC	U18MH415	Essence of Indian Traditional Knowledge	2	-	-	-		10	30	40	60	100
Total:				17	3	8	22		280	180	460	540	900
11	MC	U18CH416	Environmental Studies*	2	-	-	-		10	30	40	60	100
[L= Lecture, T = Tutorials, P = Practicals & C=Credits]				Stream-I: CSE, CSN,IT,ME				Stream-II: EEE, ECE, EIE,CE,ECI					

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

Stream-I: CSE, CSN,IT,ME
Stream-II: EEE, ECE, EIE,CE,ECI

Total Contact Periods/Week:28 **TotalCredits:22** ***For Lateral entry students only**

Open Elective II:

- U18OE401A: Applicable Mathematics (MH)
- U18OE401B: Basic Electronics Engineering (ECE)
- U18OE401C: Elements of Mechanical Engineering (ME)
- U18OE401D: Fundamentals of Measurements & Instrumentation (EIE)
- U18OE401E: Computer Networks (IT)
- U18OE401F : Renewable Energy Sources

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 1/3rd rule and Simpson's 3/8th rule.

UNIT-IV (9+3)

Solution to System of Linear Equations: Gaussian elimination method, Jacobi Method and Gauss - 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 Books:

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, 11th edition, 2010.
2. Kreyszig E., "Advanced Engineering Mathematics", John Wiley & sons, Inc., U.K., 9th edition, 2013.
3. Sastry S.S., "Introduction to numerical Analysis", Prentice Hall of India Private Limited, New Delhi, 4th edition, 2005.

Course Learning Outcomes (COs):

Upon completion of this course, the student 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 for given 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 :U18OE401A APPLICABLE MATHEMATICS																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1

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:

This course will develop student's knowledge on/in...

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:

P-N 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 (JFET), MOSFET, DMOSFET, EMOSFET.

Special Semi conductor Devices:

Operation and Characteristics- Tunnel Diode, Schottky diode, Photo Diode, Photo Transistor, PIN Diode, LED, LASER, UJT.

TextBooks:

1. Bhargava and Kulashrestha, "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", 4/e-Pearson Education Publishing company Pvt. Ltd, India

Course Learning Outcomes (COs)

Upon completion of this course, the student 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..

(Mapping of COs with POs and PSOs)

Course Articulation Matrix : U18EC401B BASIC ELECTRONICSENGINEERING																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18EC401B.1	2	2	1	2	-	-	-	-	-	-	-	-	1	-	-	1
U18EC401B.2	2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
U18EC401B.3	2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
U18EC401B.4	2	2	1	2	-	-	-	-	-	-	-	2	1	-	-	1
U18EC401B	2	2	1.5	2	-	-	-	-	-	-	-	2	1	-	-	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 (12)

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 (12)

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 (12)

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 (12)

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 Learning Outcomes (COs):

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

CO1: explain mechanical properties of an 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: U18OE401C ELEMENTS OF MECHANICAL ENGINEERING																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE401C.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	1
U18OE401C.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
U18OE401C.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	1
U18OE401C.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	1
U18OE401C	2	2	-	-	-	-	-	-	-	-	-	-	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 on / in

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 multimeter (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)

Transducers (principle of operation): 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 Books:

- 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. (Chapters 1 to 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 Edn., 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 Learning Outcomes (COs):

Upon 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: U18EI401D Fundamentals of Measurements & Instrumentation																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18EI401D.1	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D.2	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D.3	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D.4	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D	2	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 (LO) :

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 Books:

1. Mayank Dave, "Computer Networks", Second Edition, Cengage Learning, ISBN-13:978- 81-315-0986-9,2014.

Reference Books:

1. Forouzan, "Data Communication and Networking", Fifth Edition, TMH, ISBN978-0-07- 296775-3, 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 Learning Outcomes (COs):

Upon completion of this course, the student 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:U18OE401E FUNDAMENTALS OF COMPUTER NETWORKS																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE401E.1	2	1	-	1	-	1	-	-	-	-	-	1	1	-	-	1
U18OE401E.2	3	3	2	1	1	1	-	-	-	-	-	1	1	-	-	1
U18OE401E.3	3	3	2	2	1	1	-	-	-	-	-	1	1	-	-	1
U18OE401E.4	3	3	2	2	1	1	-	-	-	-	-	1	1	-	-	1
U18OE401E	2.75	2.5	2	1.5	1	1	-	-	-	-	-	1	1	-	-	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 student's 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 Books:

1. Rai G.D *"Non-Conventional Energy Sources"*, Khanna Publishers, NewDelhi
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 McGraw-Hill, NewDelhi

Reference Books:

1. EL-Wakil M.M, *"Power Plant Technology"*, McGraw-Hill, NewYork
2. Duffie and Beckman, *"Solar Energy Thermal Process"*, John Wiley & Sons, NewYork

Course Learning Outcomes (COs):

Upon completion of this course, the student 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: U18OE401F RENEWABLE ENERGY SOURCES																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE401F.1	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F.2	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F.3	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F.4	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1

U18MH402 PROFESSIONAL ENGLISH**Class:** B.Tech IV 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 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" Third Edition, Harper Collins Publishers Ltd.
3. Rosemary & Courtney, "Longman-English-Chinese Dictionary of Phrasal Verbs"

Course Learning Outcomes (COs):

Up on completion of this course, the 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: U18MH402 PROFESSIONAL ENGLISH

Course Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18MH402.1	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402.2	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402.3	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402.4	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1

U18CE403 MECHANICS OF MATERIALS

Class: B.Tech.IV-Semester

Branch: Civil Engineering

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: various methods to evaluate slope and deflection for determinate beams

LO2: determining the slope and deflection for trusses and indeterminate beams

LO3: bending stresses and critical load on columns

LO4: principles of Castigliano's theorem and failure theories

UNIT-I(9+3)

Deflection of beams: Application of double integration and Macaulay's method to calculate the slope and deflection of simply supported and cantilever beams.

Conjugate beam and moment area method: Determination of slope and deflection of simply supported and cantilever beams

UNIT-II (9+3)

Strain energy: Strain energy of beams in bending, deflection of beams from strain energy, unit load method, Castigliano's theorem-I, application to deflection of determinate plane truss.

Fixed and continuous beams: Analysis of fixed beams for shear force and bending moment, deflection of fixed beams, effect of sinking of supports, analysis of continuous beams using Clapeyron's theorem of three moments, effect of sinking of supports.

UNIT-III(9+3)

Direct and bending stresses: Stresses in a member subjected to axial, uniaxial and biaxial loading, core or kernel of a section, wind pressures on chimneys.

Columns and struts: Euler's theory, Euler's critical load for columns with various end conditions, limitations, Rankine's hypothesis, IS code formula.

UNIT-IV(9+3)

Statically indeterminate frames: Analysis of statically indeterminate portal frames up to two degree of indeterminacy using Castigliano's theorem-II.

Theories of failure: Maximum principal stress theory, maximum principal strain theory, maximum shear stress theory, strain energy theory and shear strain energy theory, applications

Text Books:

1. B. C Punmia, K. Arun Jain, K. Ashok Jain, "Mechanics of Materials", Laxmi Publications Pvt., Ltd., New Delhi, 15th edn., 2014.
2. Gunneswara Rao T. D. and Mudimby Andal "Strength of Materials", 1st edn., 2018, Cambridge University Press.

Reference Books:

1. H. J. Shah and S. B. Junnarkar, "Mechanics of Structures Volume - I and Volume - II", Charotar Publishing House Pvt., Ltd., Anand, 31st edn., 2014.
2. R. K. Bansal, "A text book of Strength of Materials", Laxmi Publications, 4th edn., 2010.
3. Andrew Pytel and L. Ferdinand Singer, "Strength of Materials", Harper and Row Publishers, New York, 4th edn., 2011.

Course Learning Outcomes (COs):

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

CO1: calculate slope and deflection of determinate beams using integral methods.

CO2: assess the slope and deflection for indeterminate beams and trusses.

CO3: determine the bending stresses and critical load on columns.

CO4: analyze portal frames by Castigliano's theorem and interpret failure theories to beams.

Course Articulation Matrix: U18CE403 MECHANICS OF MATERIALS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE403.1	2	2	1	-	-	-	-	-	-	1	-	1	2	-	1	1
U18CE403.2	2	2	1	-	-	-	-	-	-	1	-	1	2	-	2	1
U18CE403.3	2	2	1	-	-	-	-	-	-	1	-	1	2	-	1	1
U18CE403.4	2	2	1	-	-	-	-	-	-	1	-	1	2	-	2	1
U18CE403	2	2	1	-	-	-	-	-	-	1	-	1	2	-	1.5	1

U18CE404 HYDRAULICS ENGINEERING

Class: B.Tech.IV-Semester

Branch: Civil Engineering

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: interpret turbulent flow and water hammer in pipes

LO2: boundary layer theory and submerged body flows

LO3: open channel flow and analysing hydraulic jump

LO4: classification of turbines and pumps

UNIT-I(9)

Water hammer in pipes: Water hammer phenomenon, gradual and sudden closure of valves, expression for pressure rise considering elasticity of pipe, pressure relieving devices.

Turbulent flow in pipes: Characteristics of turbulent flow, shear stress due to turbulence, Reynolds stresses, Prandtl's mixing length theory, universal velocity distribution laws, Nikuradse's experiment, Karman- Prandtl resistance equation, variation of friction factor with Reynold's number-Moody's chart.

UNIT-II (9)

Boundary layer theory: Concept of boundary layer, boundary layer growth over a flat plate, boundary layer thickness, displacement thickness, momentum thickness and energy thickness, laminar and turbulent boundary layers, integral momentum equation for boundary layer, separation of boundary layer and its control.

Flow around submerged bodies: Drag and lift, basic concepts and expressions, drag and lift forces on sphere and cylinder.

UNIT-III(9)

Open channel flow: Distinction between pipe and channel flows, classification and characteristics of open channel flow, Manning's and Chezy's equations, most economical rectangular, triangular, circular and trapezoidal sections, velocity distribution in channel section.

Hydraulic jump: Energy concepts in open channel flow, specific energy curve, critical depth, critical velocity, condition for critical, subcritical and super critical flows, expression for depth of hydraulic jump, loss of energy due to hydraulic jump, channel transitions, equation for gradually varied flow, classification of surface profiles, rapidly varied flow.

UNIT-IV (9)

Hydraulic machines: Impact of jet, force on a stationary, moving flat plate and curved vanes, hydraulic turbines, heads and efficiencies, classification, Pelton Wheel, Francis turbines, specific speed, draft tube, cavitation phenomenon, characteristic curves, selection of turbines

Pumps: Introduction, centrifugal pump, heads and efficiencies, specific speed, characteristic curves, net positive suction head, priming, selection and operational difficulties, reciprocating pump, single and double acting reciprocating pumps, coefficient of discharge and slip, use of air vessels and characteristic curves.

Text Books:

1. P. N. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics Including Hydraulic Machines", Standard Book House, Rajsons Publications Pvt. Ltd., 18thedn., 2011.
2. A. K. Jain, "Fluid Mechanics Including Hydraulic Machines" Khanna Publications, 12thEdn. 2010.

Reference Books:

1. VenTe Chow, "Open Channel Hydraulics", Blackburn Publisher, 2009Edition.
2. Victor L. Streeter, E. Benjamin Wylie and Keith W. Bedford, "Fluid Mechanics", McGraw Hill, Singapore, 9thedn..
3. K. Subramanya, "Theory and Applications of Fluid Mechanics", Tata McGraw Hill, Edition 1993.

Course Learning Outcomes (COs):

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

CO1: calculate stresses due to turbulent flow and infer water hammer in pipes

CO2: summarize the concepts of boundary layer theory and flow around submerged bodies

CO3: analyse open channel flow and hydraulic jump

CO4: discuss the characteristics of turbines and pumps

Course Articulation Matrix: U18CE404 HYDRAULICS ENGINEERING																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE404.1	2	2	1	-	-	-	-	-	1	-	-	1	1	-	-	1
U18CE404.2	2	2	2	-	-	1	-	-	1	-	-	1	1	-	-	1
U18CE404.3	2	2	2	-	-	-	-	-	1	-	-	1	1	-	-	1
U18CE404.4	2	2	1	-	-	1	-	-	1	-	-	1	1	-	-	2
U18CE404	2	2	1.5	-	-	1	-	-	1	-	-	1	1	-	-	1.25

U18CE405 DESIGN OF REINFORCED CONCRETE STRUCTURES

Class: B.Tech.IV-Semester

Branch: Civil Engineering

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: concepts of limit state method of design and its application in flexure

LO2: estimation of shear, torsion and serviceability of RCC sections

LO3: design of slabs and columns using limit state design

LO4: design of footings and examine working stress method

UNIT-I(9+3)

Fundamentals of Limit State Design: Introduction, loads on structures, design philosophies, code of practice, grades of concrete, stress-strain curves of concretes, mild steel and TOR steel, characteristic loads and strengths, partial safety factors, IS codal provisions.

Limit state of collapse in flexure: Analysis and design of beams, singly, doubly reinforced rectangular and T-beams, IS codal provisions.

UNIT-II (9+3)

Shear and torsion: Types of shear, design shear strength of concrete beams, design of beams for shear, torsional shear stress for rectangular sections, reinforcement for torsion, bond, anchorage, development length, IS codal provisions.

Limit state of serviceability: Short term deflection for beams, long term deflection due to creep, differential shrinkage, IS Codal provisions.

UNIT-III(9+3)

Slabs: Loads and their distribution, design of one way simply supported, continuous slabs and two way slabs, IS Codal provisions.

Short columns: Axially loaded rectangular columns, circular columns with lateral ties and helical reinforcement, interaction curves, design for uni-axial bending moment, IS Codal provisions

UNIT-IV (9+3)

Footings: Types of footings, design of isolated footing for axially loaded columns, design of combined footing, IS Codal provisions. **Working stress method of design:** Design principles, under reinforced, balanced and over- reinforced beams, analysis and design of rectangular beams, design for shear, IS Codal provisions.

Text Books:

1. A. K. Jain, "Limit State Design", NemChand Brothers, Roorkee, 7th edn., 2012.
2. B. C. Punmia, "Reinforced Concrete Structures", Laxmi Publishing Company, New Delhi, 8th edn., 2012.

Reference Books:

1. S. Unnikrishna Pillai and Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd edn., 2011.
2. Jai Krishna and O. P. Jain, "Plain and Reinforced Concrete", NemChand Brothers, Roorkee, 8th edn., 2012.
3. IS 456, "Code of practice for Plain and reinforced concrete", Bureau of Indian standards, New Delhi, 2000.
4. IS 875 (part 1-5), "Code of practice for Design loads", Bureau of Indian standards, New Delhi, 1987.
5. SP:16, "Design Aids for Reinforced Concrete To IS 456: 1978", Bureau of Indian standards, New Delhi, 1980.

Course Learning Outcomes (COs):

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

CO1: compare the design philosophies of limit state method and its application in flexure

CO2: determine the capacities of RCC sections in shear, torsion and their serviceability

CO3: design of one way, two way slabs and axially loaded columns

CO4: analyze footings and review the working stress method

Course Articulation Matrix: U18CE405 DESIGN OF REINFORCED CONCRETE STRUCTURES																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE405.1	1	1	1	--	--	--	--	--	--	--	--	1	1	1	--	1
U18CE405.2	2	2	2	--	--	--	--	--	--	--	--	1	2	2	--	1
U18CE405.3	2	2	2	--	--	1	--	--	--	--	--	1	2	2	--	1
U18CE405.4	2	2	2	--	--	1	--	--	--	--	--	1	2	2	--	1
U18CE405	1.75	1.75	1.75	--	--	1	--	--	--	--	--	1	1.75	1.75	--	1

U18CE406 ENGINEERING GEOLOGY

Class: B.Tech.IV-Semester

Branch: Civil Engineering

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: elements of engineering geology and properties of different minerals

LO2: properties of rocks and their laboratory tests

LO3: features of structural geology and ground water exploration.

LO4: geology of dams, tunnels and natural hazard mitigation

UNIT-I(9)

General geology: Scope, objectives and branches of Engineering geology, surface features and earth's interior, processes of weathering and end products, susceptibility of rocks to weathering, river as a geological agent.

Mineralogy: Definition of crystal and mineral, physical properties and importance of minerals such as Quartz and its varieties, Feldspar, Graphite, Hornblende, Hematite, Mica, Granite, Kyanite, Calcite, Talc, Bauxite, Corundum, Gypsum, Dolomite, Beryl Apatite and other important minerals.

UNIT-II (9)

Petrology: Definition of rock, rock Cycle formation of different rocks and their classification, Igneous, Sedimentary and Metamorphic, applications to civil engineering.

Texture and Structure of rocks: Physical and engineering properties of rocks for construction granite, pegmatite, dolerite, basalt, sandstone, conglomerate, limestone, shale, laterite, schist, gneiss, quartzite, marble and slate, tests for rocks as building stone, aggregates, foundation stone, roofing and facing stones.

UNIT-III(9)

Structural Geology: Structural features like stratification, lamination, bedding planes, dip, strike, study of common geological structures associated with rocks, faults, folds, joints and their identification, unconformities, overlaps, inliers, outliers, importance of geological structures in civil engineering.

Geological Investigations: Interpretation of geological and aerial maps, hydrogeology, ground water investigation and exploration, geophysical investigations, definition, necessity, electrical resistivity and seismic refraction methods, bore hole drilling.

UNIT-IV (9)

Geology of dams, reservoirs and tunnels: Types of dams, requirements of dam site, reconnaissance, preliminary and detailed geological investigations for a dam site, leakage and silting of reservoirs,

remedial measures, tunnels and their purposes, types of tunnels and geological considerations for tunnelling.

Natural Hazards: Earthquakes, landslides and soil erosion, remedial measures to prevent damage to engineering structures, case study

Text Books:

1. N.ChennaKeshavulu, "Textbook of Engineering Geology", Macmillan Publishers, New Delhi, 2nd edition, 2009.
2. Parbin Singh, "Engineering and General Geology", S.K. Kataria and sons, New Delhi, 8th edition, 2013.

Reference Books:

1. K.V.G.K.Gokhale, "principles of engineering geology", BS Publications, Hyderabad, 1st edition, 2013.
2. David George price, "E.G. principles & practice" 7th edition, 2009.

Course Learning Outcomes (COs):

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

CO1: describe importance of minerals and their properties

CO2: classify different rocks with specific properties

CO3: interpret geological maps and explore ground water investigations

CO4: explain natural hazards and suggest remedial measures for mitigation

Course Articulation Matrix: U18CE406 ENGINEERING GEOLOGY																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE406.1	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406.2	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406.3	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406.4	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1

U18CE407 HYDRAULIC& HYDRAULIC MACHINERY LABORATORY

Class: B.Tech.IV-Semester

Branch: Civil 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 students' 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 pipes

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 mouthpiece and orifice
2. Determination of coefficient of discharge for given notches(triangular/rectangular)
3. Determination of coefficient of discharge through a given venturi flume.
4. Determination of coefficient of discharge through a given Standing wave flume.
5. Determination of coefficient of discharge for given venture and Orifice meter.
6. Verification of Bernoulli's theorem.
7. Estimation of coefficients of friction and minor losses (sudden enlargement, sudden contraction and bend).
8. Evaluate flow through Reynold's apparatus.
9. Estimate the forces caused due to impact of jet on given vanes.
10. Evaluate the characteristics of Francis Turbine
11. Evaluate the characteristics of Pelton Wheel.
12. Evaluate characteristics of Centrifugal Pump.
13. Evaluate the characteristics of Submersible Pump.
14. Evaluate the 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 Learning Outcomes (COs):

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

CO1: determine the hydraulic coefficient for various flow measuring devices

CO2: apply Bernoulli's equation in estimating head losses in pipes

CO3: Interpret the impact of jet on different vanes to determine the coefficient of impact.

CO4: evaluate the characteristics of hydraulic machines

(Mapping of COs with POs and PSOs):

Course Articulation Matrix: U18CE407 Hydraulic& Hydraulic Machinery Laboratory																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE407.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407.4	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1

U18CE408 ENGINEERING GEOLOGY LABORATORY

Class: B.Tech.IV-Semester

Branch: Civil 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 students' knowledge in /on

- LO1: identification of different minerals*
- LO2: identification of igneous, sedimentary and metamorphic rocks*
- LO3: geological maps*
- LO4: geophysical exploration technique*

LIST OF EXPERIMENTS

- Identification of Quartz and Feldspar minerals
- Identification of rock forming and ceramic minerals
- Identification of ore forming minerals
- Identification of Igneous rocks
- Identification of Sedimentary rocks
- Identification of Metamorphic rocks
- Study of geological maps: Out crop completion
- Study of geological maps: Profile drawing
- Study of geological maps: Bed thickness determination and structural features
- Visual Interpretation of Aerial photographs
- Visual Interpretation of Remote sensing imagery
- Demonstration of working model for geophysical exploration technique

Laboratory Manual:

- "Engineering Geology Laboratory Manual", prepared by the faculty of Civil Engineering.

Reference Books:

- N.Chenna Keshavulu, "Textbook of Engineering Geology", Macmillan Publishers, New Delhi, 2nd edition, 2009.
- Parbin Singh, "Engineering and General Geology", S.K. Kataria and sons, New Delhi, 8th edition, 2013.
- K. V. G. K. Gokhale, "Principles of Engineering Geology", BS Publications, Hyderabad, 1st edn., 2013.

Course Learning Outcomes (COs):

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

- CO1: identify properties of different minerals*
- CO2: classify rocks as igneous, sedimentary and metamorphic based on physical, mineral properties*
- CO3: interpret different geological maps*
- CO4: demonstrate geophysical techniques for ground water exploration*

Course Articulation Matrix :U18CE408 ENGINEERING GEOLOGY LABORATORY																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE408.1	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408.2	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408.3	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408.4	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1

U18CE409 SURVEYING FIELD WORK -II

Class: B.Tech. IV-Semester

Branch: Civil 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 students' knowledge in /on

LO1: measuring the distances and angles by tacheometry

LO2: developing contour maps by tacheometry

LO3: setting out of curves

LO4: using Total station

LIST OF EXPERIMENTS

1. Determination of tacheometric constants.
2. Determine the horizontal and vertical distances by stadia tacheometry.
3. Determine gradient of given two inaccessible points by tangential tacheometry.
4. Plot contour maps of a given area using tacheometer.
5. Setting out of simple curve using chain and tape.
6. Setting out of simple curve by Rankine's method.
7. Setting out of compound curve using theodolite.
8. Setting out the foundation trench of a building.
9. Determine the lengths and directions of consecutive survey lines using total station.
10. Determine area of given a terrain using total station.
11. Determine the elevation of the remote object using total station.
12. Determine the gradient and distance between two inaccessible points using total station.

Laboratory Manual:

1. *Survey Field Work-II lab Manual*, prepared by the faculty of Civil Engineering, KITSW.

Reference Books:

1. B.C. Punmia and Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publication, Pvt. Ltd, 16th edn., 2011
2. K.R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.

Course Learning Outcomes (COs):

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

CO1: determine the distances and angles using tacheometry

CO2: develop contour maps by tacheometry

CO3: mark out curves using chain, tape and theodolite

CO4: determine distances, angles, gradient and area using total station

Course Articulation Matrix: U18CE407 SURVEYING FIELD WORK -II

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE 409.1	2	2	-	-	-	1	-	-	2	1	-	1	2	-	1	1
U18CE 409.2	2	2	-	-	-	1	-	-	2	1	-	1	2	-	1	1
U18CE 409.3	2	2	-	-	-	1	-	-	2	1	-	1	2	-	1	1
U18CE 409.4	2	2	-	-	2	1	-	-	2	1	-	1	2	-	1	1
U18CE409	2	2	-	-	2	1	-	-	2	1	-	1	2	-	1	1

U18MH415 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Class :B.Tech.IV Semester

Branch :Common to all branches

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop the student's knowledge in/on

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; Upavedas – Dhanurveda, Sthapatveda, Gandharvaveda, Ayurveda; Vedang – Shiksha, Chanda, Vyakarna, Nirukta, Kalpa, Jyotishsha; Upanga – Dharmashastra, Mimamsa, Tarkashastra, Purvana.

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 Yogatradition – 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 Books:

1. Sathish Chandra Chatterjee, Dhirendramohan Datta, "An Introduction to Indian Philosophy", Rupa Publications Pvt. Ltd. New Delhi. (Chapter 2,3)
2. Priyadarajan 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 Prakasham 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 Learning Outcomes (COs):

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

CO1: summarize the basic structure of Vedas, Upavedas, Vedanga, Upanga

CO2: explain Vedas as principal source of knowledge for scientific inventions

CO3: describe different yogasanas, breathing techniques, chakras, meditation and their benefits

CO4: discuss the benefits of yoga as an effective tool for management of humancrisis

Course Articulation Matrix:U18MH415 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE																
CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18MH415.1	-	-	-	-	-	1	-	2	1	1	-	-	-	-	2	1
U18MH415.2	-	-	-	-	-	1	1	2	1	1	-	-	-	-	2	1
U18MH415.3	-	-	-	-	-	1	-	2	2	1	-	2	-	-	2	1
U18MH415.4	-	-	-	-	-	1	1	2	2	1	-	2	-	-	2	1
U18MH415	-	-	-	-	-	1	1	2	1.5	1	-	2	-	-	2	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 BOOKS:

1. ErachBharucha, "Text Book of Environmental Studies for Under Graduate Courses (2ndedn.)", 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. AnubhaKaushik, C.P. Kaushik, "Environmental Studies", 4/e, New AgeInternational Publishers,2014.
4. R.Rajagopalan, "Environmental Studies from crisis to cure", Oxford University Press, Second Edition,2011.

Course Learning Outcomes(COs):

After 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 : U18CH416 ENVIRONMENTAL STUDIES																
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CH416.1	2	1	2	1	-	2	1	-	1	-	-	-	1	-	2	1
U18CH416.2	-	-	2	-	-	1	2	-	1	-	-	-	1	-	2	1
U18CH416.3	1	2	1	-	-	1	2	1	1	-	-	-	1	-	2	1
U18CH416.4	-	-	1	-	-	1	2	-	1	-	-	-	1	-	2	1
U18CH416	1.5	1.5	1.5	1	-	1.25	1.75	1	1	-	-	-	1	-	2	1



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL
(An Autonomous Institute under Kakatiya University, Warangal)

URR-18R22

DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
V SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	MC	U18MH501	Universal Human Values - II*	2	-	-	-	10	30	40	60	100
2	PE	U18CE502	Professional Elective – I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18CE503	Structural Analysis	3	-	-	3	10	30	40	60	100
4	PCC	U18CE504	Environmental Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CE505	Soil Mechanics	3	-	-	3	10	30	40	60	100
6	PCC	U18CE506	Design of Steel Structures	3	-	-	3	10	30	40	60	100
7	PCC	U18CE507	Environmental Engineering Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CE508	Soil Mechanics Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CE509	Building Planning and Drawing Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CE510	Seminar	-	-	2	1	100	-	100	--	100
Total				17	-	8	19	280	180	460	540	1000
Additional Learning*:Maximum credits allowed for Honours/Minor				-	-	-	7	-	-	-	-	-
Total credits 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 = Practical's & C = Credits]

Total Contact Periods/Week: 25

Professional Elective-I/MOOC-I: U18CE502A: Advanced Concrete Technology U18CE502B: Advanced Surveying U18CE502C: Water shed Management U18CE502M: MOOCs
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U18MH501 UNIVERSAL HUMAN VALUES - II

Class: B.Tech. V- Semester

Branch(s): CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

* Pre-requisite: U18MH111 Universal Human Values - I (*Induction Programme*)

Course Learning Objectives (LOs):

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

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)

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)

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)

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)

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*, New Delhi: Excel Books, 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. Govindrajran, 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 Learning Outcomes (COs):

On completion of this course, students 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 fulfillment*
 CO4: *assess the understanding of harmony, adapt professional ethics and take part in augmenting universal human order*

Course Articulation Matrix (CAM):U18MH501 UNIVERSAL HUMAN VALUES - II																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18MH501.1	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
CO2	U18MH501.2	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
CO3	U18MH501.3	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
CO4	U18MH501.4	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
U18MH501		-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1

U18CE502A ADVANCED CONCRETE TECHNOLOGY

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

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: behaviour of admixtures and aggregates in concrete

LO2: methods of proportioning of concrete and special concretes

LO3: high-performance concrete, self curing and self compacting concretes

LO4: quality control and non-destructive testing methods of concrete

UNIT-I (9)

Cement and Admixtures: Chemical composition, Bogue's compounds, Heat of hydration, Influence of compound composition on properties of cement, Mineral and Chemical admixtures, Relevant IS codal specifications

Aggregates: Classification of aggregates, Particle shape, Texture, Gradation, Fineness modulus, Grading curves, Gap graded aggregates, Combined grading, Alkali aggregate reaction, Alkali silica reaction, Soundness of aggregate, Recycled aggregates, Relevant IS codal specifications

UNIT-II (9)

Proportioning of Concrete: Entropy-Shakloek method, Particle packing theory, Nan-Su method for self compacting concrete

Special Concretes: Self compacting concrete, Light weight concrete, Cellular concrete, Geopolymer concrete, Fibre reinforced concrete, Uses and applications

UNIT-III (9)

High Performance Concrete: High performance concrete in fresh and hardened state, Durability, Carbonation test, Chloride potential test, Half cell potentiometer test, Fire damage assessment

Self Curing and Self Compacting Concrete: Need and development of self curing and self compacting concrete, Admixtures and aggregates, EFNARC specifications for self compacting concrete, Applications of self curing and self compacting concrete, Tests on self compacting concrete

UNIT-IV (9)

Quality Control of Concrete: Quality assurance, Quality control, Quality management and quality audit-statistical quality control, Acceptance criteria, IS codal provisions

Non-Destructive Testing: Strength assessment, Rebound hammer test, Ultra sonic pulse velocity test, Validate with core sampling and testing

Text Books:

- [1] A.M. Neville, *Properties of Concrete*, 4th ed. Longman House, United Kingdom: English Language, Book society, 2015. (Chapters 1, 2, 3, 4, 5, 6 and 12)
- [2] Ken W. Day, James Aldred, Barry Hudson, *Concrete Mix Design, Quality Control and Specifications*, 3rd ed. Florida: CRC Press (Taylor and Francis group), 2016. (Chapters 2, 3, 4, 6, 7, 8, 10 and 11)

Reference Books:

- [1] M. S. Shetty, *Concrete Technology (Theory and Practice)*, 7th ed. New Delhi: S. Chand Company, 2014.
- [2] M.L. Ghambir, *Concrete Technology*, 5th ed. New Delhi: Tata McGraw Hill Publishers, 2016.
- [3] R.N. Raikar, *Diagnosis and treatment of structures in distress*, 4th ed. Mumbai: R and D Centre of Structural Designers and Consultants Pvt. Ltd., 1994.
- [4] BIS, IS 10262: 2019, *Concrete Mix Proportioning Guidelines*, 2nd revision, New Delhi: Bureau of Indian Standards, 2019.
- [5] BIS, IS 383: 2019, *Coarse and Fine Aggregate for Concrete*, New Delhi: Bureau of Indian Standards, 2019.
- [6] BIS, IS 456: 2000 *Plain and Reinforced Concrete- Code of Practice*, 5th amendment, New Delhi: Bureau of Indian Standards, 2019.
- [7] EFNARC, *Specifications and Guidelines for Self Compacting Concrete*, Norfolk, UK: EFNARC, 2002.

Course Learning Outcomes (COs):

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

CO1: interpret the behaviour of cement and gradation of aggregates

CO2: design concrete mixes using suitable methods and discuss applications of special concretes

CO3: categorize high performance, self curing and self compacting concretes

CO4: apply quality control and NDT methods for strength assessment

Course Articulation Matrix(CAM) : U18PE502A										ADVANCED CONCRETE TECHNOLOGY							
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE502A.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE502A.2	1	1	1	1	-	-	1	-	-	-	-	1	1	1	-	1
CO3	U18CE502A.3	1	-	-	1	-	-	1	-	-	-	-	1	1	1	-	1
CO4	U18CE502A.4	1	1	1	-	1	-	-	-	-	-	-	1	1	1	-	1
U18CE502A		1	1	1	1	1	-	1	-	-	-	-	1	1	1	-	1

U18CE502B ADVANCED SURVEYING

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

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: soundings, stream measurements and tunnel alignment

LO2: GIS concepts and representation of data models

LO3: concepts, methodologies and applications of Remote Sensing and digital image processing

LO4: working principles of GPS and DGPS

UNIT-I (9)

Hydrograph Surveying: Introduction, Uses, Shore line survey, Sounding equipment, Methods of locating soundings, Stream measurements

Mine Surveying: Objectives, Equipment for mine survey, Measurement of distance and difference in elevation, Tunnel alignment and setting out

UNIT-II (9)

Geographical Information System(GIS): Introduction, GIS architecture, Components of GIS, Accuracy in GIS, Data exploration and thematic layering, Levels of measurement in GIS, Applications of GIS, Geographic visualization, Query languages, Guidelines for the preparation of GIS

Data Models: GIS - data models, Types, Spatial data models, Vector and raster data structures, Advantages and disadvantages, Attribute data models, Digital Elevation Model (DEM), Applications of DEM, Data structure for continuous surface model, Functions of GIS

UNIT-III (9)

Remote Sensing: Principles of remote sensing, Components, Elements, Characteristics of Electro Magnetic Radiation(EMR), Transmission path, Types of remote sensing, Platforms, Thermal Infrared remote sensing and its applications, Scanners and sensors, Resolution, Elements of visual interpretation

Digital Image Processing: Pre-processing, Image Enhancement, Image transformations, Image classification and analysis, Data integration and analysis, Remote sensing in India

UNIT-IV (9)

Global Positioning System (GPS): Overview, GLONASS system, GALILEO system, Space segment, Operational control segment, User equipment segment, Principle of position determination via satellite generated ranging signals, Error sources

Differential Global Positioning System (DGPS): Principle, working with DGPS, GPS surveying techniques, Indian coordinate system for using GPS, Uses and applications

Text Books:

- [1] SatheshGopi, R. Sathikumar and N. Madhu, *Advanced Surveying*, 2nd ed. New Delhi: Pearson Education, 2017. (Chapters 1, 2, 3, 7 and 14)
- [2] S. K. Duggal, *Surveying Vol. II*, 4th ed. New Delhi: McGraw Hill Education, 2017. (Chapters 4 and 9)

Reference Books:

- [1] B.C. Punmia, *Surveying Vol. II*, 17th ed. New Delhi: Laxmi publications, 2016.
- [2] R. Subramanian, *Surveying and Levelling*, 2nd ed. New Delhi: Oxford University Press, 2007.
- [3] K.R. Arora, *Surveying Vol.II*, 15th ed. New Delhi: Rajsons publications, 2018.
- [4] http://civil.iisc.ernet.in/~nagesh/rs_gis.htm.

Course Learning Outcomes (COs):

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

CO1: interpret soundings, stream measurements and tunnel alignment

CO2: utilise GIS concepts and interpret data using data models

CO3: analyze methodologies of remote sensing, applications of remote sensing and process of digital imaging

CO4: summarize the working principles of GPS and DGPS

Course Articulation Matrix (CAM): U18CE502B ADVANCED SURVEYING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1 U18CE502B.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2 U18CE502B.2	1	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1
CO3 U18CE502B.3	1	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1
CO4 U18CE502B.4	1	-	-	-	1	-	-	-	-	-	-	1	1	-	-	1
U18CE502B	1	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1

U18CE502C WATERSHED MANAGEMENT

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

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: characteristics of watershed and soil erosion

LO2: participatory rural appraisal and erosion control measures

LO3: water conservation, harvesting and ground water management

LO4: ecosystem and grassland management

UNIT-I (9)

Watershed Concepts: Objectives, Need for watershed development, Characteristics of watershed- Size, Shape, Physiographic, Slope, Climate, Drainage, Land use, Vegetation, Geology and Soils, Hydrology, Hydrogeology and Socioeconomic; Watershed management

Soil Erosion: Basic processes, Factors affecting soil erosion, Land capability classification

UNIT-II (9)

Participatory Rural Appraisal (PRA): Basic principles, Assumptions, Important types, Benefits, Tools, Maps and Models of PRA programmes

Erosion Control Measures: Contour cultivation, Contour bunding, Graded bunds, Bench terracing, Grassed water ways, Mechanical erosion control measures for non-agricultural land, Contour trenching, Gully control measures, Vegetative control measures, Check dams, Brush dams, Semi permanent gully, Control structures

UNIT-III (9)

Water Conservation and Harvesting: Rainwater harvesting, Catchment harvesting, Harvesting structures, Soil moisture conservation, Check dams, Artificial recharge, Farm ponds, Percolation tanks, Groundwater

Management in Watershed: Types of aquifers, Vertical distribution of groundwater, Conjunctive use of surface and use of groundwater

UNIT-IV (9)

Ecosystem Management: Role of ecosystem, Crop husbandry, Soil enrichment, Inter mixed and strip-cropping, Cropping pattern, Sustainable agriculture, Bio-mass management, Dry land agriculture, Silvopasture, Horticulture, Social forestry and afforestation

Grassland Management: Joint forestry management monitoring and evolution of watershed, Planning of watershed management activities, Preparation of action plan, Administrative requirements

Text Book:

[1] J. V. S. Murthy, *Watershed Management*, 5th ed. New Delhi: New Age International Publishers, 2014.

Reference Books:

[1] R. A. Wurbs and W. P. James, *Water Resource Engineering*, London: Prentice Hall Publishers, 2015..

[2] V. V. N. Murthy, *Land and Water Management*, 6th ed. New Delhi: Kalyani Publications, 2011.

[3] Rajesh Rajora, *Integrated Watershed Management*, 2nd ed. New Delhi: Rawat publications, 2019.

[4] D. K. Majumdar, *Irrigation and Water Management*, 2nd ed. New Delhi: Printice Hall of India, 2005.

Course Learning Outcomes (COs):

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

CO1: identify characteristics of watershed & the factors affecting soil erosion

CO2: investigate participatory rural appraisal methods and apply different erosion control measures for agricultural & non-agricultural lands

CO3: summarize water conservation, harvesting & ground water management methods

CO4: develop action plan for ecosystem management & watershed management

Course Articulation Matrix (CAM): U18CE502C WATERSHED MANAGEMENT

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE502C.1	1	-	1	-	-	1	1	-	-	-	-	1	1	1	-	1
CO2	U18CE502C.2	1	-	1	-	-	1	1	-	1	-	-	1	1	1	-	1
CO3	U18CE502C.3	1	-	1	-	-	1	1	-	-	-	1	1	1	1	-	1
CO4	U18CE502C.4	1	-	1	-	-	1	1	-	-	-	1	1	1	1	-	1
U18CE502C		1	-	1	-	-	1	1	-	1	-	1	1	1	1	-	1

U18CE503 STRUCTURAL ANALYSIS

Class: B.Tech. V- Semester

Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: Civil Engineering (CE)

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: compatibility, equilibrium equations and analysis of indeterminate structures using slope deflection method

LO2: distribution of internal forces at joints using moment distribution method

LO3: internal forces using Kani's method & approximate analysis of tall structures

LO4: variation of internal forces in a structural member using conventional method and influence line diagram for moving loads

UNIT-I (9)

Slope Deflection Method for Beams: Development of slope-deflection equations, Sign convention, Analysis of continuous beams with and without sinking of supports, Construction of bending moment diagram and shear force diagrams

Slope Deflection Method for Frames: Rectangular portal frames with and without side sway for single bay single storey

UNIT-II (9)

Moment Distribution Method for Beams: Distribution and carry over factors, Analysis of continuous beams with and without sinking of supports

Moment Distribution Method for Frames: Rectangular portal frames with and without side sway for single bay single storey

UNIT-III (9)

Kani's Method: Analysis of statically indeterminate beams with and without sinking of supports

Approximate Methods: Approximate analysis of frames using portal method and cantilever method

UNIT-IV (9)

Moving Loads: Maximum bending moment and shear force diagrams for simple beams traversed by single point load, A pair of point loads, Uniformly distributed load shorter and longer than the span, Series of point loads, Absolute maximum bending moment and shear force, Enveloping parabola and equivalent udl

Influence Line Diagrams: Influence line diagram for support reaction, Bending moment and shear force for simple and over hanging beams, Influence line diagrams for stresses in members for through type bridge trusses

Text Book:

[1] S. Ramamrutham and R. Narayan, *Theory of Structures*, 9th ed. New Delhi: Dhanpat Rai Publications, 2014.

Reference Books:

- [1] B. C. Punmia and A. K. Jain, *Theory of Structures*, 13th ed. New Delhi: Laxmi Publications, 2005.
 [2] C.S. Reddy, *Basic Structural Analysis*, 19th ed. New Delhi: Tata McGraw Hill Education, 2017.
 [3] C. K. Wang, *Indeterminate Structural Analysis*, 5th ed. New Delhi: McGraw Hill Education, 2017.
 [4] Sujit Kumar Roy and Subrata Chakrabarty, *Fundamentals of structural analysis with computer analysis and applications*, revised ed. New Delhi: S. Chand and Company Ltd., 2012.

Course Learning Outcomes (COs):

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

CO1: develop compatibility and equilibrium equations for the analysis of indeterminate structures

CO2: evaluate the distribution of forces at joints, bending moment and shear force diagrams for indeterminate structures

CO3: analyze the structures using Kani's method & tall structures using approximate analysis

CO4: determine the variation of internal forces in structural members for moving loads

Course Articulation Matrix (CAM): U18CE503 STRUCTURAL ANALYSIS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE503.1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE503.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE503.3	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE503.4	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE503		1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1

U18CE504 ENVIRONMENTAL ENGINEERING

Class: B.Tech. V- Semester

Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: Civil Engineering (CE)

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: quantity and quality aspects of water

LO2: procedures in water treatment and distribution

LO3: sewage analysis and hydraulic design of sewers

LO4: primary and secondary treatment methods of sewage

UNIT – I (9)

Water Demand: Classification of sources of water supply, Choice of source, Types of water demand, Per capita demand, Factors affecting per-capita demand, Factors affecting water losses, Fluctuations in water demand and its effects on water supply scheme, Design period, Population forecasting methods, Fire demand

Water Quality: Physical, Chemical and biological characteristics of water quality, Waterborne diseases and their control, Quality standards for municipal supplies

UNIT – II (9)

Purification of Water: Water treatment, Screening, Plain sedimentation, Sedimentation aided with coagulation, Filtration, Disinfection, Softening, Aeration

Distribution System: General requirements, Layouts of distribution networks, Methods of supply, Systems of supply, Distribution reservoirs, Types, Functions, Storage capacity of distribution reservoirs, Design of distribution networks, Appurtenances in distribution system

UNIT – III (9)

Sewage Characteristics: Physical, Chemical and Biological characteristics of sewage, Analysis of sewage, Bio-chemical oxygen demand and dissolved oxygen profile processes and kinetics involved, Sewerage systems, Merits and demerits, Estimation of dry weather flow, Estimation of storm water flow

Sewer and Sewer Appurtenances: Hydraulic design of sewer, Hydraulic formulae for design of sewers, Minimum and maximum velocity of flow, Materials, Joints, Shapes, Sewer appurtenances

UNIT – IV (9)

Sewage Treatment: Process flow diagram, Primary treatment, Theory and design of screens, Grit chamber, Skimming tanks, Sedimentation tanks

Secondary Treatment of Sewage: Activated sludge process, Sewage filtration, Oxidation ditch, Oxidation ponds, Aerated lagoons, Rotating biological contactors, Treatment and disposal of sludge, On-site disposal methods (land and water body)

Text Books:

- [1] P.N. Modi, *Water supply Engineering-Environmental Engineering-I*, 5th ed. New Delhi: Standard Book House, 2016. (Chapters 1, 2, 6, 8, 9 and 10)
- [2] P.N. Modi, *Sewage Treatment and Disposal – Environmental Engineering-II*, 5th ed. New Delhi: Standard Book House, 2015. (Chapters 1, 2, 3, 4, 6, 8, 11, 13, 14 and 17)

Reference Books:

- [1] Howard S. Peavy, Donald R. Rower and George Tchobanoglous, *Environmental Engineering*, New Delhi: McGraw-Hill International Edition, 2014.
- [2] B.C. Punmia, A.K. Jain, A.K.Jain, *Water supply Engineering-Environmental Engineering-I*, 2nd ed. New Delhi: Laxmi Publications, 2016.
- [3] B.C. Punmia, A.K. Jain, A.K.Jain, *Waste water Engineering-Environmental Engineering-II*, 2nd ed. New Delhi: Laxmi Publications, 2016.
- [4] The Expert Committee, CPHEEO *Manual on Water Supply and Treatment*, 3rd ed. New Delhi: Ministry of Urban Development, Govt. of India, 1999.
- [5] The Expert Committee, CPHEEO, *Manual on Sewerage and Sewage Treatment Systems*, 3rd ed. New Delhi: Ministry of Urban Development, Govt. of India, 2013.
- [6] Metcalf and Eddy, *Waste Water Engineering: Treatment and Reuse*, New Delhi: McGraw-Hill Edition, 2017.

Course Learning Outcomes (COs):

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

CO1: analyze problems related to water quality and quantity

CO2: apply methods for purification of water and design water distribution systems

CO3: analyze and design the sewage systems

CO4: apply methods for purification and disposal of sewage

Course Articulation Matrix(CAM):U18CE504 ENVIRONMENTAL ENGINEERING																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE504.1	1	1	-	-	-	1	1	-	-	-	-	1	1	1	-	1
CO2	U18CE504.2	1	1	1	1	-	1	1	-	-	-	-	1	1	1	-	1
CO3	U18CE504.3	1	1	-	-	-	1	1	-	-	-	-	1	1	1	-	1
CO4	U18CE504.4	1	1	1	1	-	1	1	-	-	-	-	1	1	1	-	1
U18CE504		1	1	1	1	-	1	1	-	-	-	-	1	1	1	-	1

U18CE505 SOIL MECHANICS

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

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: soil properties and effective stress principle

LO2: permeability and seepage analysis

LO3: compaction and consolidation mechanisms

LO4: stress distribution methods and shear strength parameters

UNIT-I (9)

Basic Properties and Classification of Soils: Soil formation, Soil structure, Phase diagrams, Water content, Specific gravity, Void ratio, Porosity, Degree of saturation, Density, Mass, Weight, Volume relationships, Relative density, Sieve analysis, Grain size distribution curves, Atterberg limits, Stoke's law and its limitations, Hydrometer analysis, IS classification, Field identification, Consistency index, Activity, Thixotrophy, Sensitivity

Effective Stress: Soil water classification, Effective stress principle, Total, Effective, Neutral stresses, Hydrostatic condition

UNIT - II (9)

Permeability: Darcy's law and its limitations, Determination of coefficient of permeability, Coefficient of permeability for different soils, Factors affecting permeability of soils, Permeability of stratified soils

Seepage Analysis: Seepage force, Hydrodynamic conditions, Critical hydraulic gradient, Quicksand condition, Characteristics of flow net, Construction of flow net, Uses of flow net, Flow net for anisotropic soils

UNIT -III (9)

Compaction: Introduction, Proctor's compaction test, Zero air voids curve, Saturation line, Factors affecting compaction, Effect of compaction on soil properties, Field compaction, Relative compaction

Consolidation: Mechanism of consolidation, Characteristic compression curves, Consolidation parameters, Normal, Under and over consolidated clays, Terzaghi's one dimensional consolidation theory, Assumptions, Derivation, Determination of coefficient of consolidation, Magnitude and rate of consolidation settlements

UNIT -IV (9)

Stress Distribution: Boussinesq equation for point, Line, Circular and rectangular loads, Westergaard's analysis for point load, Concept and use of pressure bulb, Construction and use of Newmark's influence chart, Approximate methods, Contact pressure distribution under rigid and flexible footings in sand and clay

Shear Strength: Introduction to normal and shear stresses, Mohr's circle, Characteristics of Mohr's circle, Mohr-Coulomb theory, Revised Mohr-Coulomb equation, Direct shear test, Unconfined compression test, Vane shear test, Triaxial test, Consolidated drained, Consolidated undrained and unconsolidated undrained shear tests, Factors affecting the shear strength of clays and sands, Critical void ratio, Liquefaction

Text Book:

[1] K. R. Arora, *Soil Mechanics and Foundation Engineering*, 9th ed. New Delhi: Standard Publishers, 2013.

Reference Books:

- [1] GopalRanjan and A.S.R. Rao, *Basic and Applied Soil Mechanics*, Revised 3rd ed. New Delhi: New Age International Publishers, 2016.
- [2] B.C. Punmia, Er. Ashok K. Jain, Arun K. Jain, *Soil Mechanics and Foundations*, 17th ed. New Delhi: Laxmi Publications (P) Ltd, 2017.
- [3] C. Venkatramaiah, *Geotechnical Engineering*, 6th ed. New Delhi: New Age Publications, 2018.
- [4] T. W. Lambe and Whitman, *Soil Mechanics*, New Delhi: New Age Publications, 2017.

Course Learning Outcomes (COs):

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

CO1: analyze soils and apply the principle of effective stress

CO2: estimate coefficient of permeability using Darcy's equation and seepage analysis

CO3: analyze compaction and consolidation mechanisms

CO4: evaluate vertical stresses and shear strength parameters of soil

Course Articulation Matrix(CAM):U18CE505 SOIL MECHANICS																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE505.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE505.2	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE505.3	1	1	1	1	-	-	-	-	-	-	-	1	1	1	-	1
CO4	U18CE505.4	1	1	1	1	-	-	-	-	-	-	-	1	1	1	-	1
U18CE505		1	1	1	1	-	-	-	-	-	-	-	1	1	1	-	1

U18CE506 DESIGN OF STEEL STRUCTURES

Class: B.Tech. V- Semester

Branch: Civil Engineering(CE)

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: philosophies of steel design and bolted connections

LO2: design of tension and compression members

LO3: behaviour of flexural members and column bases

LO4: types of bolted and welded connections

UNIT-I (9)

Principles of Limit State Design: Types of structural steel, Advantages, Design philosophies-Working stress, Limit state, Ultimate load methods, Ultimate and serviceability limit states, Loads and load combinations, Partial safety factors

Bolted Connections: Types of bolted connections, Lap and butt connection, Assumptions made in analysis, Failure of bolted connections, Efficiency of joints and Strength of plate connections

UNIT - II (9)

Tension Members: Types of tension members, Behavior of tension members, Net sectional area, Analysis of tension members, Sectional efficiency, Design of tension members, Splices in tension members

Compression Members: Types of column sections, Behavior of compression member, Classification of cross sections, Slenderness for flexural buckling, Design considerations, Analysis and Design of compression member, Design of built-up compression member

UNIT - III (9)

Flexural Members: Types of sections for beams, Behavior of beams in flexure, Classification of beam cross sections, Plastic moment carrying capacity of section, Stability of beams, Failure modes, Design criteria for beams, Effective span of beams, Design moment and shear strength, Built up beam sections

Column Bases: Design of slab base, Gusseted base and Grillage foundation

UNIT - IV (9)

Eccentric Connections: Beam - Column Connections, Bolted Framed connections, Un-Stiffened and Stiffened seat connections, Bolted bracket connections

Welded Connections: Welding, Methods of welding, Types of welded joints, Specifications for fillet welded joints, Strength of fillet welds, Stresses due to individual forces, Combination of stresses, Design of joint

Text Book:

- [1] S. S. Bhavikatti, *Design of Steel Structures: By Limit State Method as Per IS: 800-2007*, 3rd ed. New Delhi: International Publishing House Pvt. Ltd, 2012.

Reference Books:

- [1] N. Subramanian, *Design of Steel Structures: By Limit State Method as Per IS: 800-2007*, 5th ed. New Delhi: Oxford University Press, 2018.
- [2] M.L. Gambhir, *Fundamentals of Structural steel design*, New Delhi: Tata McGraw-Hill Education, 2013.
- [3] S.K. Duggal, *Limit state design of steel structures*, 2nd ed. New Delhi: Tata McGraw-Hill Education, 2014.
- [4] BIS, *IS 800:2007 General construction in steel - Code of practice*, 3rd ed. New Delhi: Bureau of Indian standards, 2007. (permitted for examination)
- [5] BIS, *SP: 6 (1-7) Handbook for structural engineers*, New Delhi: Bureau of Indian standards, 1980.

Course Learning Outcomes (COs):

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

CO1: distinguish design philosophies in steel structures and analyze bolted connections

CO2: design different types of steel sections subjected to tension & compression

CO3: determine the design capacity of steel flexural members & column bases

CO4: evaluate the strength of eccentric bolted & welded connections

Course Articulation Matrix (CAM): U18CE506 DESIGN OF STEEL STRUCTURES

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE506.1	1	1	2	-	-	-	-	-	-	-	-	1	1	2	-	1
CO2	U18CE506.2	1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1
CO3	U18CE506.3	1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1
CO4	U18CE506.4	1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1
U18CE506		1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1

U18CE507 ENVIRONMENTAL ENGINEERING LABORATORY

Class: B.Tech.V- Semester

Branch: Civil Engineering (CE)

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 on/in...

LO1: physical analysis of water

LO2: chemical analysis of water

LO3: optimum coagulant dosage for effective sedimentation

LO4: determination of dissolved oxygen of water

LIST OF EXPERIMENTS

1. Determination of pH and Alkalinity of water sample
2. Determination of Acidity of water sample
3. Determination of Total Solids, Total dissolved solids and Suspended solids of water sample
4. Determination of Conductivity of water sample
5. Determination of Temporary and Permanent Hardness of water sample
6. Determination of Optimum Coagulant dosage of water sample using Jar test
7. Determination of Chloride content of water sample
8. Determination of Dissolved Oxygen of water sample
9. Determination of Biological Oxygen Demand of water sample
10. Determination of Chemical Oxygen Demand of water sample
11. Determination of Break-point Chlorination
12. Determination of Sulphates

Laboratory Manual:

- [1] *Environmental Engineering Laboratory Manual*, prepared by the faculty of Civil Engineering Department, KITSW.

Reference Books:

- [1] B. Kotaiah and Dr. N. Kumara Swamy, *Environmental Engineering Laboratory Manual*, Anand city: Charotar Publishing House Pvt. Ltd, 2007.
- [2] P. N. Modi, *Water supply Engineering- Environmental Engineering -I*, 5th ed. New Delhi: Standard Book House, 2013.
- [3] P. N. Modi, *Sewage Treatment and Disposal – Environmental Engineering-II*, 5th ed. New Delhi: Standard Book House, 2013.

Course Learning Outcomes (COs):

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

CO1: assess the quality of water for suspended matter

CO2: evaluate hardness and chloride content of the water samples

CO3: estimate dissolved oxygen concentration in water sample

CO4: determine the concentration of degradable organic matter

Course Articulation Matrix(CAM):U18CE507 ENVIRONMENTAL ENGINEERING LABORATORY																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE507.1	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
CO2	U18CE507.2	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
CO3	U18CE507.3	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
CO4	U18CE507.4	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
U18CE507		1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1

U18CE508 SOIL MECHANICS LABORATORY

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

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 on / in...

LO1: IS classification of soils

LO2: determination of engineering properties of soils

LO3: evaluation of shear strength parameters of soils

LO4: field testing for safe bearing capacity and shear strength

LIST OF EXPERIMENTS

- Determination of Consistency Limits:
(a) Liquid limit (b) Plastic limit (c) Shrinkage limit
- Classification of Coarse Grained Soil through Sieve Analysis
- Determination of In-situ Density by
a) Core cutter method b) Sand replacement method
- Determination of OMC and Maximum Dry Density using
a) IS light compaction test b) IS heavy compaction test
- Determination of Coefficient of Permeability using
a) Constant head method b) Falling head method
- Determination of Coefficient of Consolidation
- Determination of Shear Strength Parameters using Direct Shear test
- Determination of undrained cohesion using unconfined compression Test
- Determination of Specific Gravity of Solids
- Demonstration of Hydrometer Analysis for Fine Grained Soil
- Demonstration of Standard penetration test
- Demonstration of (a) Vane shear test (b) Tri-Axial Shear test
- Demonstration of Plate load test

Laboratory Manual:

- Geotechnical Engineering Laboratory Manual, prepared by faculty of Civil Engineering Department, KITSW.

Reference Books:

- B. M. Das, *Soil Mechanics Laboratory Manual*, 9th ed. New Delhi, Oxford University Press, 2015.
- SP 36 (Part - I): *Compendium of Indian Standards on Soil Engineering*, New Delhi, Bureau of Indian Standards, 1987.

Course Learning Outcomes (COs):

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

CO1: classify the soil using IS classification system

CO2: determine the engineering properties of soil

CO3: evaluate shear strength parameters

CO4: interpret soils through field tests

Course Articulation Matrix (CAM): U18CE508 SOIL MECHANICS LABORATORY

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1 U18CE508.1	1	-	-	1	-	1	2	1	2	1	1	1	-	-	1	1
CO2 U18CE508.2	1	-	-	1	-	1	1	-	2	1	1	1	-	-	1	1
CO3 U18CE508.3	1	-	-	1	-	1	-	-	2	1	2	1	-	-	1	1
CO4 U18CE508.4	2	-	-	1	1	1	-	-	2	1	2	1	-	-	1	1
U18CE508	1.25	-	-	1	1	1	1.5	1	2	1	1.5	1	-	-	1	1

U18CE509 BUILDING PLANNING AND DRAWING LABORATORY

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

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 on/in...

LO1: functional planning of building and conventional signs

LO2: different types of doors, windows and stair cases

LO3: developing plan, section and elevation of buildings using AutoCAD

LO4: develop a 3D plan from floor plan

LIST OF EXPERIMENTS

1. Introduction to Building Planning as per NBC recommendations
2. Description of Building components as per NBC recommendation
3. Introduction to AutoCAD, practice drawing and modify commands in AutoCAD
4. Drawing Conventional signs in AutoCAD
5. Planning of space from Line diagram and development of plan, section and elevation
6. Drawings of Various types of doors, windows
7. Plan and Section of Dog-Legged staircase, Open Well Staircase and Spiral Staircase using AutoCAD
8. Plan, section and elevation of a residential building with restricted/unrestricted plinth area
9. Plan, section and elevation of a school building
10. Plan, section and elevation of a primary health centre
11. Development of site layout with restricted area for required amenities
12. Plan of a Dream house/Duplex house
13. Floor plan of a Residential Complex/Apartment
14. Development of a floor plan into 3D building

Laboratory Manual:

- [1] *Computer Aided Building Drawing Laboratory Manual*, prepared by faculty of Civil Engineering Department, KITSW.

Reference Books:

- [1] Bureau of Indian Standards, *National Building Code of India*, 2nd revision, New Delhi: BIS, 2016.
- [2] M. G. Shah, C. M. Kale, S. Y. Patki, *Building Drawing: With an Integrated Approach to Built Environment*, New Delhi: Tata McGraw Hill Book Company Limited, 2002.
- [3] T. Jeyapoovan, *Engineering Drawing and Graphics Using Autocad*, 3rd ed. New Delhi: Vikas Publishing, 2016.

Course Learning Outcomes (COs):

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

CO1: illustrate conventional signs and functional planning of buildings

CO2: distinguish types of doors, windows and staircases

CO3: create plan, section and elevation of buildings using AutoCAD

CO4: develop floor plan into 3D building plan

Course Articulation Matrix (CAM): U18CE509									Building Planning And Drawing Laboratory								
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE509.1	1	-	-	-	1	-	-	1	-	-	-	1	1	-	-	1
CO2	U18CE509.2	1	-	-	-	1	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE509.3	1	-	1	-	1	1	1	1	-	-	-	1	1	1	1	1
CO4	U18CE509.4	1	-	1	-	1	1	1	1	-	-	-	1	1	1	1	1
U18CE509		1	-	1	-	1	1	1	1	-	-	-	1	1	1	1	1

U18CE510 SEMINAR

Class:B.Tech.V- Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

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

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 and (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 to qualify 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:
- he/she is absent for oral presentation and viva-voce
 - he/she fails to submit the report in prescribed format
 - he/she fails to fulfill the requirements of seminar evaluation as per specified guidelines
- (f) 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 seminar evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes(COs):

On completion of this course, students 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):U18CE510SEMINAR																	
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE510.1	1	1	-	1	1	-	1	2	2	2	1	2	1	1	1	1
CO2	U18CE510.2	1	1	-	-	-	-	-	2	2	2	-	2	1	1	1	1
CO3	U18CE510.3	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1	1
CO4	U18CE510.4	-	-	-	-	-	-	-	2	2	2	-	2	1	1	1	1
U18CE510		1	1	-	1	1	-	1	2	2	2	1	2	1	1	1	1



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL
(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VI SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

VI – Semester (New Proposal)

URR-18R22

Sl.No	Category	CourseCode	CourseTitle	Periods/week			Credits	EvaluationScheme					
				L	T	P		C	TA	CIE		ESE	Total Marks
										MSE	Total		
1	HSMC	U18TP601	QuantitativeAptitude&LogicalReasoning	2	-	-	1	10	30	40	60	100	
2	ESC	U18CS611	Advanced Data Structures	3	-	-	3	10	30	40	60	100	
3	PE	U18CE603	ProfessionalElective-II/MOOC-II	3	-	-	3	10	30	40	60	100	
4	PCC	U18CE604	Estimation and Valuation	1	2	-	3	10	30	40	60	100	
5	PCC	U18CE605	Hydrology and Water Resources Engineering	3	-	-	3	10	30	40	60	100	
6	PCC	U18CE606	ConstructionManagementandEquipment	3	-	-	3	10	30	40	60	100	
7	ESC	U18IT611	ObjectOrientedProgrammingthrough JAVA	3	-	-	3	10	30	40	60	100	
8	PCC	U18CE607	StructuralEngineeringDetailingLaboratory	-	-	2	1	40	-	40	60	100	
9	ESC	U18IT612	JAVAProgrammingLaboratory	-	-	2	1	40	-	40	60	100	
10	ESC	U18CS612	Advanced Data Structures Lab	-	-	2	1	40	-	40	60	100	
11	PROJ	U18CE608	MiniProject	-	-	2	1	100	-	100	--	100	
Total				18	2	8	23	250	210	460	540	1000	
Additional Learning*:Maximum credits allowed for Honours /Minor				-	-	-	7	-	-	-	-	-	
Total credits for Honours/Minor students:				-	-	-	23+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= Practical's & C=Credits] **Total Contact Periods/Week: 27**

Professional Elective-II / MOOC-II U18CE603A: Advanced Analysis of Structures U18CE603B: Ground Improvement Techniques	U18CE603C: Advanced Environmental Engineering U18CE603M: MOOCs
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U18TP601 QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B.Tech VI-Semester

Branch(s): CE, EIE, EEE, ECE, ECI

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, Permutation & 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] R S Agarwal, *Quantitative Aptitude for Competitive Examinations*, 3rd ed. New Delhi: S. Chand Publications, 2019. (Chapters 1,6,7,8,10,11,12,15,17,21,22,30,31)
- [2] R S Agarwal, *A Modern Approach to Verbal and Non-Verbal Reasoning*, 3rd ed. New Delhi: 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*, New Delhi: Pearson India, 2019.
- [2] Nishit K Sinha, *Reasoning for Competitive Examinations*, New Delhi: Pearson India, 2019.
- [3] R.N. Thakur, *General Intelligence and Reasoning*, New Delhi: McGraw Hill Education, 2017.

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): U18TP601								Quantitative Aptitude And LogicalReasoning									
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18TP601.1	1	2	-	1	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18TP601.2	1	2	-	1	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18TP601.3	-	1	-	2	-	2	-	-	-	-	-	1	1	-	-	1
CO4	U18TP601.4	-	1	-	2	-	2	-	-	-	-	-	1	1	-	-	1
U18TP601		1	1.5	-	1.5	-	2	-	-	-	-	-	1	1	-	-	1

U18CS611ADVANCED DATA STRUCTURES

Class:B. Tech III-Semester

Branch: Computer Science & Engineering

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 Books:

[1] Debasis Samanta, *Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009. (Chapters 3 to 8)

Reference Books:

[1] Reema Thareja, *Data Structures Using C*, 2nd ed., New Delhi: Oxford University Press, 2014.

[2] E Balagurusamy, *Data Structure Using C*, 1st ed., New Delhi: McGraw Hill Education, 2017.

[3] Richard F. Gilbert and Behrouz A. Forouzan, *Data Structures: A Pseudo code Approach with C*, 2nd ed., New Delhi: Cengage Learning 2007.

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 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: 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):U18CS306 ADVANCED DATA STRUCTURES																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CS306.1	2	2	2	2	1	1	-	1	1	1	-	1	2	2	2
CO2	U18CS306.2	2	2	2	2	1	1	-	1	1	1	-	1	2	2	2
CO3	U18CS306.3	2	2	2	2	1	1	-	1	1	1	-	2	2	2	2
CO4	U18CS306.4	2	2	2	2	1	1	-	1	1	1	-	2	2	2	2
U18CS306		2	2	2	2	1	1	-	1	1	1	-	1.5	2	2	2

U18CE603A ADVANCED ANALYSIS OF STRUCTURES

Class: B.Tech. VI-Semester

Branch: Civil Engineering (CE)

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: analysis of three and two hinged arches

LO2: cable and suspension bridges under different loads

LO3: analysis of indeterminate structures using flexibility matrix method

LO4: analysis of indeterminate structures using stiffness matrix method

UNIT – I (9)

Three Hinged Arches: Principle of arch action, Eddy's theorem, Circular and parabolic arches - Determination of horizontal thrust, Bending moment, Normal thrust, Radial shear force, Influence line diagrams

Two Hinged Arches: Principle involved in analysis of two hinged arches, Circular and parabolic arches - Determination of horizontal thrust, Bending moment, Normal thrust, Radial shear force, Influence line diagrams

UNIT – II (9)

Cables: Forces in cables subjected to point loads and uniformly distributed load, Cables with supports at same levels and different levels, Length of cable, Different support conditions, Influence line diagrams

Suspension Bridges: Simple suspension bridges with two hinged and three hinged stiffening girders, Bending moment and shear force diagrams, Influence line diagrams

UNIT – III (9)

Flexibility Matrix Method for Beams: Determination of internal and external static indeterminacy for different types of structures, Analysis of beams up to second degree of static indeterminacy, Bending moment and shear force diagrams

Flexibility Matrix Method for Frames: Rectangular portal frames – Second degree of static indeterminacy; Bending moment and shear force diagrams, Analysis of statically indeterminate plane trusses up to second degree

UNIT – IV (9)

Stiffness Matrix Method for Beams: Determination of kinematic indeterminacy for different types of structures, Analysis of continuous beams up to second degree of kinematic indeterminacy, Bending moment and shear force diagrams

Stiffness Matrix Method for Frames: Rectangular portal frames up to second degree of kinematic indeterminacy, Bending moment and shear force diagrams, Analysis of statically indeterminate plane trusses up to second degree of kinematic indeterminacy

Text books:

[1] C.S. Reddy, *Basic Structural Analysis*, 3rd ed. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2017. (Chapters 2, 8 and 10)

[2] G.S. Pandit and S.P. Gupta, *Structural Analysis - A Matrix Approach*, 2nd ed. New Delhi: McGraw Hill Education Pvt. Ltd., 2017. (Chapters 1, 4, 5, 6 and 7)

Reference Books:

- [1] J.S. Przemieniecki, *Theory of Matrix Structural Analysis*, 3rd ed. Columbia: Dover Publications Inc., 2018.
- [2] Weaver and Gere, *Matrix analysis of framed structures*, 5th ed. New Delhi: CBS Publishers and distributors Pvt. Ltd., 2018.
- [3] Praveen Nagarajan, *Matrix Methods of Structural Analysis*, New Delhi: CRC Press, 2018.
- [4] Sujit Kumar Roy and Subrata Chakrabarty, *Fundamentals of structural analysis with computer analysis and applications*, revised ed. New Delhi: S. Chand and Company Ltd., 2012.

Course Learning Outcomes (COs):

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

CO1: analyze three and two hinged arches

CO2: evaluate internal forces for cables and suspension bridges under different loadings

CO3: apply flexibility matrix method to estimate internal forces for beams and frames

CO4: apply stiffness matrix method to determine internal forces for beams and frames

Course Articulation Matrix (CAM): U18CE603A ADVANCED ANALYSIS OF STRUCTURES																	
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE603A.1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE603A.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE603A.3	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE603A.4	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE603A		1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1

U18CE603B GROUND IMPROVEMENT TECHNIQUES

Class: B.Tech. VI-Semester

Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: Civil Engineering (CE)

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: dewatering and grouting techniques

LO2: field densification methods

LO3: materials and methods of soil stabilization

LO4: materials and techniques used for soil reinforcement

UNIT - I (9)

Dewatering: Definition, Methods of dewatering, Sumps and Interceptor ditches, Single and Multistage well points, Vacuum well points, Horizontal wells, Foundation drains, Blanket drains, Criteria for selection of fill material around drains

Grouting: Definition, Objectives of grouting, Grouts and their properties, Ascending, Descending and Stage grouting methods, Hydraulic fracturing in soils and rocks, Post grout tests

UNIT - II (9)

Compaction: Equipment for shallow compaction, Factors affecting field compaction of soils, Deep compaction, Vibration techniques, Vibro-flotation, Terra probe method, Blasting, Compaction piles, Field compaction and control

Liquefaction Control: Liquefaction, Differences between liquefaction and quicksand condition, Damage potential of liquefaction, Factors affecting liquefaction, Methods to prevent liquefaction

UNIT - III (9)

Stabilization: Methods of stabilization, Mechanical, Cement, Lime, Bituminous, Chemical stabilization with calcium chloride, Sodium silicate and gypsum

Techniques of Stabilization: Vertical drains, Sand wicks, Synthetic drains, Stone columns, Soil-lime columns, Soil-cement columns

UNIT - IV (9)

Reinforced Earth: Concept of reinforced earth, Effect of reinforcement on soils, Materials, Geotextiles - Types, Functions and applications; Principles of interfacial friction and its determination, Factors affecting friction coefficient, Applications of reinforced earth

In-situ Reinforcing Techniques: Necessity, Ground anchors, Types and application, Tie back, Soil nailing, Driven and grouted nails, Anchored spider netting

Text Book:

- [1] Purushotham Raj, *Ground Improvement Techniques*, 4th ed. New Delhi: Laxmi Publications, 2006.

Reference Books:

- [1] M. R. Hausmann, *Engineering Principles of Ground Modification*, 3rd ed. New Delhi: McGraw Hill International Edition, 2002.
- [2] M. P. Moseley, *Ground Improvement*, 2nd ed. Florida, USA: Blackie Academic and Professional, Boca Taton, 2007.
- [3] GopalRanjan and A.S.R. Rao, *Basic and Applied Soil Mechanics*, 3rd ed. New Delhi: New Age Publishers, 2016.
- [4] M. Braja Das and G. V. Ramana, *Principles of Soil Dynamics*, 2nd ed. Stanford USA: Cengage Learning, 2006.

Course Learning Outcomes (COs):

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

CO1: apply suitable dewatering and grouting technique for a given field condition

CO2: recommend suitable field densification method considering physical properties of soil

CO3: analyze soil condition and recommend technique for soil stabilization

CO4: propose suitable material & technique for soil reinforcement

Course Articulation Matrix (CAM): U18CE603B GROUND IMPROVEMENT TECHNIQUES

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE603B.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE603B.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE603B.3	1	-	-	-	-	1	1	-	-	-	-	1	1	1	-	1
CO4	U18CE603B.4	1	-	-	-	-	1	1	-	-	-	-	1	1	1	-	1
U18CE603B		1	1	-	-	-	1	1	-	-	-	-	1	1	1	-	1

U18CE603C ADVANCED ENVIRONMENTAL ENGINEERING

Class: B.Tech.VI-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

UNIT – I (9)

Air Pollution: Sources and classification of air pollutants, Effects of air pollution, Global effects, Air quality and emission standards, Sampling of pollutants in ambient air, Stack sampling

Meteorology: Factors influencing air pollution, Wind rose, Mixing depths, Lapse rates and dispersion, Atmospheric stability, Plume rise and dispersion, Prediction of air quality - Box model, Gaussian model; Dispersion coefficient, Height of chimney

UNIT – II (9)

Control of Particulate Pollutants: Properties of particulate pollutants, Particle size distribution, Control mechanism of settling chambers, Cyclones, Wet dust scrubbers, Fabric filters and Electrostatic precipitators

Control of Gaseous Pollutants: General process and equipment for the removal by chemical methods, Operation of absorption, Adsorption, Combustion and Condensation equipment

UNIT – III (9)

Stream Sanitation: Characteristics of the treatment plant effluents, Self-purification in a stream, Zones of pollution in the stream, Oxygen sag analysis, Mathematical analysis using Streeter phelps equation

Advanced Biological Wastewater Treatment: Nitrogen removal by biological nitrification and denitrification, Phosphate removal, Sequential batch reactors, Up flow anaerobic sludge blanket reactor

UNIT – IV (9)

Industrial Effluent Treatment: Characteristics of industrial effluent, Methods of treatment adopted for sugarcane, Distillery, Textile and Dairy industry

Noise Pollution: Definition, Characteristics of sound, Effects, Measurement, Control of noise pollution

Text Books:

- [1] M.N. Rao and H.V.N. Rao, *Air Pollution*, New Delhi: Tata – McGraw Hill Publishing Co., Ltd, 2014. (Chapters 1, 2, 3, 9, 10, 15 and 19)
- [2] P. N. Modi, *Sewage Treatment and Disposal – Environmental Engineering-II*, 4th ed. New Delhi: Standard Book House, 2013. (Chapters 8, 15, 18 and 19)

Reference Books:

- [1] S. Howard Peavy, R. Donald Rower and George Tchobanoglous, *Environmental Engineering*, New Delhi: McGraw Hill International Edition, 2014.
- [2] G.S. Birdie, J.S. Birdie, *Water Supply and Sanitary Engineering*, New Delhi: Dhanpat Rai Publications, 2013.
- [3] Metcalf and Eddy, *Wastewater Engineering – Treatment and Reuse*, 4th ed. New Delhi: McGraw Hill Education (India) Pvt. Ltd., 2002.
- [4] The Noise Pollution (Regulation and Control) Rules, New Delhi: Ministry of Environment and Forests, 2000.

Course Learning Outcomes (COs):

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

CO1: summarize concepts of air quality and atmospheric stability

CO2: identify methods required for removal of particulate and gaseous pollutants

CO3: analyze stream sanitation using streeterphelps equation and biological waste water treatment

CO4: adapt effluent treatment methods and noise pollution control measures

Course Articulation Matrix (CAM): U18CE603C ADVANCED ENVIRONMENTAL ENGINEERING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1 U18CE603C.1	1	1	1	-	-	1	1	1	-	-	-	1	1	1	1	1
CO2 U18CE603C.2	1	1	-	-	-	1	1	1	-	-	-	1	1	1	1	1
CO3 U18CE603C.3	2	1	-	1	1	1	1	1	-	-	-	1	2	1	1	1
CO4 U18CE603C.4	2	2	1	1	-	1	1	1	-	-	-	1	1	1	1	1
U18CE603C	1.5	1.25	1	1	1	1	1	1	-	-	-	1	1.25	1	1	1

U18CE604 ESTIMATION AND VALUATION

Class: B.Tech. VI-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
1	2	-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

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

LO1: measurement and estimation of elements of civil engineering works

LO2: detailed estimation of quantities and preparation of tender documents

LO3: performing rate analysis and preparation of valuation report for a residential building

LO4: types of contract and estimation of miscellaneous engineering works

UNIT-I (9)

Quantity Surveying: Scope of quantity survey, Units of measurement, Methods of measurement for excavation, Concrete, Brick masonry, Steel, Wood work

Measurements: Essentials of estimation, Advantages, Estimation of isolated, Step foundation, Volume of earth work at same level by midsection, Mean sectional area, Prismoidal methods, Importance, Maintenance of measurement book

UNIT-II (9)

Estimation of Quantities: Different types of estimates, Methods of estimation - Centre line, Individual wall method; Calculation of quantities of brick work, RCC, PCC, Plastering, White washing and painting, Estimate of wood work for doors and frames, Preparation of detailed and abstract estimate for framed structures, Bar bendingschedule

Tenders: Types of tender, Tender notice, Earnest money, Security deposit, Liquidated damages, Arbitration, Escalation, Costing and preparation of tender document

UNIT-III (9)

Specifications and Rate analysis: Objectives of specifications, Specifications for earth work excavation, Concrete, Damp proof course(DPC), Form work, Brick masonry, Flooring, Painting and Wood work, Schedule of rates, Rate analysis for cement concrete, DPC, Brick masonry, Plastering, Flooring, Painting **Valuation:** Objectives, Market value, Book value, Assessed value, Mortgage value, Replacement value, Capital cost, Cost escalation, Sinking fund, Depreciation methods, Preparation of valuation report for residential building

UNIT-IV (9)

Contracts: General requirements of contract, Types of contracts, Conditions, Termination of contract, Departmental procedures for execution of works

Miscellaneous Estimates: Preparation of detailed and abstract estimate for septic tank with soak pit, Slab culvert, Road project

Text Book:

- [1] B. N. Dutta, *Estimating and Costing in Civil Engineering*, 27th ed. New Delhi: UBS Publishers, 2014.

Reference Books:

- [1] D.D. Kohli and R.C. Kohli, *A Text Book of Estimating and Costing (Civil)*, 13th ed. New Delhi: S. Chand and Company Ltd., 2004.
- [2] G.S. Birdie, *A Text Book of Estimating and Costing for Civil Engineering*, 6th ed. New Delhi: Dhanpat Rai publishing company (P) Ltd., 2014.
- [3] M. Chakraborty, *Estimating, Costing, Specification and Valuation in Civil Engineering*, 29th ed. Kolkata: Chakraborty Publishers, 2006.
- [4] Bureau of Indian Standards, *SP 27 : 1987 (R2003): Handbook of Method of Measurement of Buildings Works*, New Delhi: Reaffirmed 2003.

Course Learning Outcomes (COs):

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

CO1: measure quantities pertaining to civil engineering works

CO2: estimate quantities and propose tender documents for construction projects

CO3: determine rate analysis and valuation report for a building

CO4: distinguish types of contract and estimate miscellaneous civil engineering works

Course Articulation Matrix (CAM):U18CE604											ESTIMATION AND VALUATION					
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE604.1	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
U18CE604.2	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
U18CE604.3	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
U18CE604.4	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
U18CE604	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1

U18CE605 HYDROLOGY AND WATER RESOURCES ENGINEERING

Class: B. Tech. VI-Semester

Branch: Civil Engineering(CE)

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 on/in...

LO1: estimation of rainfall, evaporation, evapotranspiration

LO2: infiltration, runoff, hydrographs

LO3: ground water hydraulics and irrigation methods

LO4: design of channels and dams

UNIT – I (9+3)

Hydrologic Cycle and Precipitation: Definitions, Water budgeting, Types of precipitation, Recording and non-recording type of rain gauges, Errors in measurement, Location of rain gauges, Analysis of rain fall data by mass curves, Hyetograph, Intensity duration analysis, Estimation of missing precipitation data

Evaporation and Evapotranspiration: Factors affecting the processes and their estimation, Pan evaporation, Blaney Criddle, Hargreaves, Penmann and Lysimeter methods, Methods of reducing evaporation from reservoirs

UNIT – II (9+3)

Infiltration and Run off: Factors affecting infiltration, Measurements of infiltration, Infiltration indices, Factors affecting runoff, Estimation of runoff from rainfall, Flow duration curve & mass curve and their uses

Hydrograph Analysis: Characteristics of hydrograph, Separation of base flow, Unit hydrograph, S- curve hydrograph

UNIT – III (9+3)

Groundwater: Types of aquifers, Unconfined and confined aquifers, Well hydraulics, Recuperation test for yield of open well, Introduction to flood routing

Concepts of Irrigation: Duty and delta, Quality of irrigation water, Soil water relationships, Root zone soil water, Infiltration, Consumptive use, Irrigation requirement, Frequency of irrigation, Methods of applying water to the fields - Surface, Sub-surface, Sprinkler and drip irrigation

UNIT – IV (9+3)

Distribution Systems: Canal systems, Alignment of canals, Design of channels, Alluvial channels, Kennedy's and Lacey's theory of regime channels

Dams and Spillways: Classification, Embankment dams, Design considerations, Estimation and control of seepage, Slope protection, Spillways, Components of spillways, Types of gates for spillway crest

Text Books:

- [1] P. Jayarami Reddy, *A Textbook of Hydrology*, 4th ed. New Delhi: Laxmi Publishers, 2017. (Chapters 1, 2, 4, 5, 7 to 11)
- [2] K. R. Arora, *Irrigation, Water Power and Water Resources Engineering*, 5th ed. New Delhi: Standard Publications, 2019. (Chapters 10, 12, 14, 15, 20 and 22)

Reference Books:

- [1] K. Subramanya, *Engineering Hydrology*, 4th ed. New Delhi: Tata McGraw Hill Book Co, 2017.
- [2] Dr.P.N. Modi, *Irrigation Water Resources and Water Power Engineering*, 9th ed. New Delhi: Standard Book House, 2014.
- [3] R. S. Varshney, *Engineering Hydrology*, 4th ed. New Delhi: Nemchand Bros, 2012.
- [4] S.K. Garg, *Irrigation Engineering and Hydraulic Structures*, 35th ed. New Delhi: Khanna Publishers, 2018.
- [5] <https://nptel.ac.in/content/storage2/courses/105101010/downloads/Lecture31.pdf>.

Course Learning Outcomes(COs):

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

CO1: estimate rainfall, evaporation and evapotranspiration

CO2: measure infiltration, runoff and analyze hydrographs

CO3: distinguish ground water hydraulics and irrigation methods

CO4: evaluate design parameters of channels and dams

Course Articulation Matrix (CAM): U18CE605 Hydrology And Water Resources Engineering																
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE605.1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE605.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE605.3	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE605.4	1	1	1	-	-	1	-	-	-	-	-	1	1	1	-	1
U18CE605	1	1	1	-	-	1	-	-	-	-	-	1	1	1	-	1

U18CE606 CONSTRUCTION MANAGEMENT AND EQUIPMENT

Class: B.Tech. VI-Semester

Branch: Civil Engineering (CE)

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: functions of construction management, processes and project planning

LO2: project scheduling and cost management

LO3: construction equipment and its management

LO4: pre-requisites for implementation of quality and safety measures in construction

UNIT - I (9)

Construction Management: Stages of construction project, Construction team and their functions, Functions of construction management, Planning, Organizing, Staffing, Directing, Controlling and coordinating, Construction activities, Processes, Workers, Estimating, Schedule, Productivity and mechanized construction, Construction document

Preliminary Project Planning: Site layout, Infrastructure development - Security, Office and Residence, Power, Water, Access roads, Drainage, Illumination, Storage yards, Workshop, Garage, Parking, Testing facilities, Medical care, Firefighting facilities, Communication and fuel station facilities

UNIT - II (9)

Project Scheduling: Methods of scheduling, Bar charts/Gantt chart, Milestone charts, Network analysis, Limitations and advantages, Network and its development, Work breakdown structure, Network techniques, Activity, Event, Network diagram by Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Time estimates, Floats and Slacks

Cost Management: Direct and Indirect cost of project, Cost slope and Crashing of activities, Resource allocation, Levelling and Smoothing

UNIT - III (9)

Construction Equipment: Classification of equipment, Power shovel, Back hoe, Dragline, Clamshell, Bulldozers, Scrapers, Tractors, Smooth wheel rollers, Sheep foot rollers and Pneumatic rollers, Dump trucks, Dumpers, Derrick cranes, Mobile cranes, Gantry cranes, Belt conveyor, Tunnelling and Rock drilling equipment

Management of Construction Equipment: Need for mechanization, Financing aspects of construction plants and equipment, Factors affecting selection of construction equipment, Planning of construction equipment, Factors affecting the cost of owning and operating the construction equipment

UNIT - IV (9)

Quality Control in Construction: Importance and elements of quality, Organization for quality control, Quality assurance techniques, Documentation, Quality circles

Construction Safety Management: Importance of safety, Causes of accidents, Classification of accidents, Safety measures, Safety benefits to stakeholders, Measuring of safety.

Text Books:

- [1] SubhagitSaraswati, *Construction Technology*, New Delhi: Oxford University Press, 2008. (Chapters 1 and 2)
- [2] S. Seetharaman, *Construction Engineering and Management*, 5th ed. New Delhi: Umesh Publications, 2017. (Chapters 3, 4, 7, 8 and 9)

Reference Books:

- [1] K.N.Jha, *Construction Project Management: Theory and Practice*, 2nd ed. New Delhi: Pearson Education India, 2018.
- [2] B. L. Gupta, *Construction Management, machinery and accounts*, 4th ed. New Delhi: Standard Publishers, 2017.
- [3] L. S. Srinath, *PERT and CPM principles and applications*, 3rd ed. New Delhi: East West Press, 2015.
- [4] K. K. Chitkara, *Construction Project Management: Planning, scheduling and controlling*, 3rd ed. New Delhi:

Course Learning Outcomes (COs):

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

CO1: perceive process of construction management and planning

CO2: estimate project duration and cost

CO3: appraise various construction equipment and their applicability

CO4: recommend norms for implementation of quality and safety aspects

McGraw Hill Education, 2014.

Course Articulation Matrix(CAM):U18CE606 Construction Management andEquipment																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE606.1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
CO2	U18CE606.2	1	-	-	-	-	-	-	-	-	-	2	1	1	-	1	1
CO3	U18CE606.3	1	-	-	-	-	-	-	-	-	-	1	1	1	-	1	1
CO4	U18CE606.4	1	-	-	-	-	1	-	-	-	-	1	1	1	1	1	1
U18CE606		1	-	-	-	-	1	-	-	-	-	1.25	1	1	1	1	1

U18IT611 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Class: B.Tech.VI-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

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: concepts of polymorphism, interfaces and packages

LO4: exception handling, string handling, input and output operations

UNIT- I (9)

Fundamentals of ObjectOriented 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 variables, 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, FinalKeyword.

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, StaticImport.

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 strings, Modifying a string, Changing string cases, Joining strings.

I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

1. Herbert Schildt, *JAVA The Complete Reference*, 9thed., McGraw-Hill Education India Pvt.Ltd ,2014.
2. E.Balagurusamy, *Programming with JAVA: A Primer*, 5thed., McGraw-Hill Publication Ltd,2014.

References Books:

1. P. Radha Krishna, *Object Oriented Programming through JAVA*, Universities Press, 2011.
2. Herbert Schildt, *JAVA The Complete Reference*, 9thed., McGraw-Hill Education India Pvt. Ltd., 2011.
3. Kathy Sierra, Bert Bates, *Head First Java*, 2nded., O'Reilly Publications, 2005.
4. Uttam K. Roy, *Advanced JAVA Programming*, Oxford Publications, 2015.

Course Learning Outcomes (COs):

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

CO1: illustrate object oriented concepts and java programming features

CO2: solve computing problems using classes, objects and inheritance concepts

CO3: use polymorphism, interfaces and packages for developing object oriented programs

CO4: develop applications using exception handling, string handling, input and output Operations

Course Articulation Matrix (CAM): U18IT611 Object Oriented Programming Through Java

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CO1 U18IT611.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2 U18IT611.2	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO3 U18IT611.3	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO4 U18IT611.4	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
U18IT611	1.75	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1

U18CE607 STRUCTURAL ENGINEERING DETAILING LABORATORY

Class: B. Tech. VI-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
-	-	2	1

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

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

LO1: structural aspects and detailing of different types of beams

LO2: detailing of various types of slabs

LO3: design detailing various types of columns, footings and stair case

LO4: detailing of various types of steel structures

LIST OF EXPERIMENTS

Preparation of working drawings using AutoCAD for the following structural elements as per SP-34, the elements are to be designed prior to preparation of drawings.

- 1 Structural detailing of R.C.C Simply Supported Beam
- 2 Structural detailing of R.C.C Continuous Beam and Cantilever Beam
- 3 Structural detailing of R.C.C Slabs
- 4 Structural detailing of R.C.C Tied Column
- 5 Structural detailing of R.C.C Spirally Reinforced Column
- 6 Structural detailing of R.C.C Isolated Footings
- 7 Structural detailing of R.C.C Combined Footings
- 8 Structural detailing of shear reinforcement in R.C.C beams
- 9 Structural detailing of R.C.C. stair case
- 10 Structural detailing of steel beam connections
- 11 Structural detailing of Built up Column
- 12 Structural detailing of Grillage Foundation

Laboratory Manual:

- [1] BIS, *Hand book on Concrete Reinforcement and Detailing-SP 34 :1987*, New Delhi: Bureau of Indian Standards, 1987.

Reference Books:

- [1] S. MahaboobBasha, *Structural Engineering Drawing*, New Delhi: Radiant Publishing House,2018.
 [2] B.C. Punmia, A.K.Jain, *R.C.C Designs*, 10th ed. New Delhi: Laxmi publishers,2015.
 [3] Arya and Ajmani, *Design of steel structures*, 5th ed, Roorkee: Nem Chand and Bros,1992.
 [4] S. Kanthimathinathan, *Manual for Detailing of Steel Steel Structures*, New Delhi: International Publishing House Pvt. Ltd.,2016.

Course Learning Outcomes(COs):

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

CO1: compile the structural detailing of R.C.C. beams

CO2: develop the detailing plan of various types of slabs

CO3: assess the philosophies in designing various types of columns, footings and stair case

CO4: compose working drawings of various types of steel structures

Course Articulation Matrix (CAM): U18CE607 Structural Engineering Detailing Laboratory																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE607.1	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
CO2	U18CE607.2	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
CO3	U18CE607.3	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
CO4	U18CE607.4	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
U18CE607		1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1

U18IT612 JAVA PROGRAMMING LABORATORY

Class: B.Tech.VI-Semester

Branch: Civil Engineering (CE)

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: basic concepts of object oriented programming

LO2: classes, objects and inheritance features

LO3: concepts of polymorphism, interfaces and packages

LO4: exception handling, string handling, input and output operations

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

5. Write a program to demonstrate loop control statements.
6. Write a program to demonstrate for-each control loop.
7. Implement programs using single dimensional arrays.
8. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment -III

9. Write a program to demonstrate creating object to a class for accessing variables and methods.
10. Write a program to demonstrate creating multiple objects.
11. Write a program to demonstrate passing objects to methods.
12. Write a program to demonstrate constructors and garbage collector by invoking it explicitly.

Experiment -IV

13. Write a program to demonstrate static members.
14. Write a program to demonstrate command line arguments.
15. Write a program to demonstrate variable length argument.
16. Write a program to demonstrate wrapper classes.

Experiment -V

17. Write a program to demonstrate inheritance using extends keyword.
18. Write a program to demonstrate multilevel inheritance.
19. Write a program to demonstrate hierarchical inheritance.
20. Write a program to demonstrate access controls.

Experiment -VI

21. Write a program to demonstrate *this* and *super* keywords.
22. Write a program to demonstrate dynamic method dispatch.
23. Write a program to demonstrate final variable and methods.
24. Write a program to demonstrate use of abstract class.

Experiment -VII

25. Write a program to define an interface and implement it into a class.
26. Write a program to implement multiple interfaces into a single class.
27. Write a program to extend interfaces.
28. Write a program to implement nested interfaces.

Experiment -VIII

29. Write a program to create a package and demonstrate to import a package into a class.
30. Write a program to demonstrate access protection of packages.
31. Write a program to demonstrate static import of package.

Experiment-IX

32. Write a program to demonstrate *try* and *catch* statements for exception handling.
33. Write a program to handle Array Index Out of Bounds Exception, Number Format Exception and Divide by Zero Exception using multiple catch blocks.
34. Write a program to demonstrate user defined exception with throw keyword.
35. Write a program to demonstrate finally block.

Experiment-X

36. Write a program to demonstrate string searching functions.
37. Write a program to demonstrate string comparison functions.
38. Write a program to demonstrate string modification functions.

Experiment-XI

39. Write a program to demonstrate reading and writing input using byte stream classes.
40. Write a program to demonstrate reading and writing input using character stream classes.
41. Write a program to demonstrate data input and output streams.
42. Write a program to demonstrate array input and output streams.

Experiment-XII

43. Write a program to create a file using byte stream classes.
44. Write a program to create a file using character stream classes.
45. Write a program to copy the content of one file to another.

Laboratory Manual:

1. Java Programming laboratory Manual, Dept. of IT, KITSW.

Text Books:

1. Herbert Schildt, *JAVA The Complete Reference*, 9th ed., McGraw-Hill Education India Pvt.Ltd, 2014.
2. E.Balagurusamy, *Programming with JAVA: A Primer*, 5th ed., McGraw-Hill Publication Ltd, 2014.

Course Learning Outcomes(COs):

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

CO1: develop programs to implement object oriented programming concepts using java

CO2: develop programs using classes, objects and inheritance concepts

CO3: experiment with polymorphism, interfaces and packages

CO4: build applications using exception handling, string handling, input and output operations

Course Articulation Matrix (CAM): U18IT612 JAVA PROGRAMMING LABORATORY																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18IT612.1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18IT612.2	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18IT612.3	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18IT612.4	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
U18IT612		2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1

U18CS612 ADVANCED DATA STRUCTURES LABORATORY

Class: B. Tech III-Semester

Branch: Computer Science & 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: 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) insertion of a node iii) traversal using recursion.

Experiment-II

2. Program to perform following binary search tree operations.
i) creation ii) deletion of a node iii) traversal using recursion.

Experiment III

3. Program to perform following binary search tree traversal operations without recursion.
i) In order ii) Preorder iii) Post order iv) Spiral order

Experiment-IV

4. Program to implement AVL tree construction.

Experiment-V

5. Program to implement B-tree construction.

Experiment-VI

6. Program to implement search and insert operations on Trie.
7. Program to implement Fibonacci search.

Experiment-VII

8. Program to implement Quick sort.
9. Program to implement Merge sort.

Experiment-VIII

10. Program to implement heap sort.
11. Program to implement Bitonic generator sort.

Experiment-IX

12. Program to implement Topological sort.
13. Program to implement the following graph traversal techniques.
14. a) Prim's algorithm b) Kruskal's algorithm

Experiment-X

15. Program to implement the following graph traversal techniques.
a) Depth first search b) Breadth first search.

16. Program to implement Kosaraju's algorithm.

Experiment-XI

17. Program to implement Naive Algorithm.
18. Program to implement Knuth - Morris - Pratt (KMP) Algorithm ,

Experiment-XII

19. Program to implement Boyer Moore Algorithm

20. Program to implement Rabin Karp Algorithm:

Laboratory Manual:

1. 'Advanced Data Structures' laboratory manual, prepared by faculty of Dept. of Computer Science & Engineering.

Reference Books:

- [1] Debasis Samanta, *Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009.
- [2] Reema Thareja, *Data Structures Using C*, 2nd ed., New Delhi: Oxford University Press, 2014
- [3] E Balagurusamy, "Data Structure Using C", *McGraw Hill Education*, 1st Edn., ISBN-13: 978-125-902-9547, 2017.

Course Learning Outcomes(COs):

Upon 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.

Mapping of the Course Learning Outcomes with Program Outcomes:

U18CS308ADVANCED DATA STRUCTURES LABORATORY																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CS308.1	1	1	3	1	1	1	1	1	1	1	0	2	1	1	3
CO2	U18CS308.2	1	1	2	2	1	1	1	1	-	1	-	2	1	1	2
CO3	U18CS308.3	1	1	3	3	2	1	1	1	-	1	-	3	1	1	3
CO4	U18CS308.4	1	1	3	2	3	2	2	2	-	2	-	3	1	1	3
U18CS308		2	1	1	2.75	2	1.75	1.25	1.25	1.25	1	1.25	0	2.5	1	1

U18CE608 MINI PROJECT

Class: B.Tech.VI-Semester

Branch: Civil Engineering (CE)

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: 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 miniproject
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 on the chosen work and demonstrate before the DMPEC as per the dates specified by DMPEC
- (c) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by DMPEC
- (d) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute
- (e) **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
- (f) **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
- (g) The student has to register for the Mini project 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 Mini project evaluation as per specified guidelines

- (h) 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 Mini project evaluation and send the award list to the 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): U18CE608 MINI PROJECT																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE608.1	1	1	2	2	1	1	1	2	2	2	1	2	1	1	1	1
CO2	U18CE608.2	1	1	-	2	-	-	-	2	2	2	-	2	1	1	1	1
CO3	U18CE608.3	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1	1
CO4	U18CE608.4	-	-	-	-	-	-	-	2	2	2	-	2	1	1	1	1
U18CE608		1	1	2	2	1	1	1	2	2	2	1	2	1	1	1	1



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL
(An Autonomous Institute under Kakatiya University, Warangal)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
VII SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

VII – Semester (New Proposal)

Sl.No	Category	CourseCode	CourseTitle	Periods/week			Credits	EvaluationScheme				
				L	T	P		C	CIE			TotalMarks
									TA	MSE	Total	
1	OE	U18OE701	OpenElective-III	3	-	-	3	10	30	40	60	100
2	PE	U18CE702	ProfessionalElective-III/MOOC-III	3	-	-	3	10	30	40	60	100
3	PE	U18CE703	ProfessionalElective-IV/MOOC-IV	3	-	-	3	10	30	40	60	100
4	PCC	U18CE704	HighwayEngineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CE705	HighwayEngineeringLaboratory	-	-	2	1	40	-	40	60	100
6	PCC	U18CE706	CivilEngineeringSoftware ApplicationsLaboratory	-	-	2	1	40	-	40	60	100
7	PROJ	U18CE707	MajorProject-Phase-I	-	-	6	3	100	-	100	-	100
8	MC	U18CE708	InternshipEvaluation *	-	-	2	-	100	-	100	-	100
Total				12	-	12	17	320	120	440	360	800
Additional Learning*:MaximumcreditsallowedforHonours/Minor				-	-	-	7	-	-	-	-	-
TotalcreditsforHonours/Minorstudents:				-	-	-	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= Practical's & C=Credits]

Total Contact Periods/Week: 24

Open Elective-III: U18OE701A: Disaster Management U18OE701B: Project Management U18OE701C: Professional Ethics in Engineering U18OE701D: Management Economics and Accountancy	Professional Elective-III / MOOC-III: U18CE702A: Advanced Structural Design U18CE702B: Hydraulic Structures U18CE702C: Sustainable Materials and Green Buildings U18CE702M: MOOCs	Professional Elective-IV/MOOC-IV: U18CE703A: Structural Dynamics U18CE703B: Foundation Engineering U18CE703C: Repair and Rehabilitation of Structures U18CE703M: MOOCs
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U18OE701A DISASTER MANAGEMENT

Class: B.Tech. VII–Semester

Branch(s): ME,CSE,IT&CE,EIE,EEE,ECE&ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

ContinuousInternal Evaluation	40marks
EndSemesterExamination	60marks

Course Learning Objectives (LOs):

This course will develop students, 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- Earthquakes, 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 (9)

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

Textbook:

[1] Rajibshah 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 Learning Outcomes (COs):

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

CO1: classify the disasters and discuss natural & non-natural disasters, their implications, the institutional & legal frame work 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 d disaster management for infrastructure, utilize geospatial in formation in agriculture and apply multimedia technology for disaster risk management & training

Course Articulation Matrix (CAM) : U18OE701A DISASTER MANAGEMENT															
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18OE701A.1	-	-	-	-	-	2	2	1	-	-	1	1	-	-
CO2	U18OE701A.2	-	-	-	-	-	2	2	1	-	-	1	1	1	1
CO3	U18OE701A.3	-	-	-	-	-	2	2	1	-	-	1	1	-	-
CO4	U18OE701A.4	-	-	-	-	-	2	2	1	-	-	1	1	1	1
U18OE701A		-	-	-	-	-	2	2	1	-	-	1	1	1	1

U18OE701B PROJECT MANAGEMENT

Class: B.Tech.VII-Semester

Branch(s): ME,CSE,IT&CSN,CE,EIE,EEE,ECE&ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

ContinuousInternal Evaluation	40marks
EndSemesterExamination	60marks

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

Textbook:

[1] Harold Kerzner, *Project 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 Jmantel 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*, 4th ed. Abingdon, UK: Taylor & Francis, 2012.
- [3] Adedeji B. Badiru, *Project Management: Systems, Principles and Applications*, Florida, USA: CRC Press, 2012.

Course Learning Outcomes (COs):

On completion of the course, the student 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): U18OE701B PROJECT MANAGEMENT															
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	U18OE701B.1	-	-	-	-	-	1	-	-	-	1	1	-	1	1
CO2	U18OE701B.2	-	-	-	-	-	1	-	2	-	1	1	-	1	1
CO3	U18OE701B.3	1	1	-	-	-	1	-	-	-	1	1	-	1	1
CO4	U18OE701B.4	1	1	-	-	-	1	-	-	-	1	1	-	1	1
U18OE701B		1	1	-	-	-	1	-	2	-	1	1	-	1	1

U18OE701CP PROFESSIONALE ETHICS IN ENGINEERING

Class: B.Tech.VII-Semester

Branch(s): ME, CSE, IT & CSN, CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

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

LO1: human values and engineering ethics

LO2: professionalism, theory of virtue 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: Multi national 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)

Textbook:

[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 Learning Outcomes (COs):

On completion of this course, students 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): U18OE701C PROFESSIONAL ETHICS IN ENGINEERING															
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18OE701C.1	-	-	-	-	-	1	-	2	1	-	-	1	1	-
CO2	U18OE701C.2	-	-	-	-	-	1	-	2	1	-	-	1	1	-
CO3	U18OE701C.3	-	-	-	-	-	1	-	2	1	-	-	1	1	1
CO4	U18OE701C.4	-	-	-	-	-	1	-	2	1	-	-	1	1	1
U18OE701C		-	-	-	-	-	1	-	2	1	-	-	1	1	1

U18OE701D MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VI-Semester

Branch(s): CE, EIE, EEE, ECE & ECI

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: basic concepts of management

LO2: concepts of economics and forms of business organizations

LO3: fundamentals of accountancy and journalising

LO4: preparation of final accounts

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

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

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; Cash book (Single column), Preparation of Trial balance

UNIT - IV (9)

Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments

Text Books:

- [1] Y. K. Bhushan, *Fundamentals of Business Organization and Management*, 20th ed. New Delhi: Sultan Chand & Sons, 2017. (Chapters 1, 2 & 4)
- [2] T. S. Grewal, S.C. Gupta, *Introduction to Accountancy*, 8th ed. New Delhi: S. Chand Publications, 2014. (Chapters 1, 2, 3, 4, 6 & 8)

Reference Books:

- [1] Harold Koontz and Heinz Weihrich, *Essentials of Management*, 6th ed. New Delhi: Tata McGraw Hill Publications, 2006.
- [2] L.M. Prasad, *Principles and Practice of Management*, 9th ed. New Delhi: Sultan Chand, 2016.
- [3] R.L. Gupta & V.K. Gupta, *Principles and Practice of Accountancy*, 14th ed. New Delhi: Sultan Chand and Sons, 2018.

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 & forms of business organizations

CO3: pass journal entries & post them into ledgers

CO4: prepare profit & loss accounts and assess the financial position through the balance sheet

Course Articulation Matrix (CAM):U18MH602 MANAGEMENT ECONOMICS AND ACCOUNTANCY																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18MH602.1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1
CO2	U18MH602.2	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	1
CO3	U18MH602.3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO4	U18MH602.4	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
U18MH602		-	-	-	-	-	-	-	-	-	1	1.25	-	-	-	-	1

18CE702A ADVANCED STRUCTURAL DESIGN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in / on...

LO1: guidelines for design of doglegged staircase & grid slab

LO2: behavior of retaining walls

LO3 : performance of various types of water retaining structures

LO4: design of different types of foundations

UNIT-I(9)

Design of dog legged stair case: Types of stair cases, Loads on stair cases slabs, Design of dog legged staircase.

Grid Slabs: Proportioning of grid dimensions, Design of grid slabs.

UNIT-II(9)

Cantilever Retaining wall: Types of rain forced walls, Theories of earth pressure, Rankine's earth pressure theory, Coulomb's earth pressure theory, Design of cantilever retaining wall.

Counter-fort Retaining wall: Behavior of counter fort retaining wall, Design of counter fort retaining wall.

UNIT-III(9)

Rectangular Water Tank: Design requirements as per IS3370 – 2021 Earth pressure on tank walls, Up lift pressure on the floor of the tank, Design principles of ground rectangular water tank.

Circular Water Tank: Joints in water tanks, Circular water tank with rigid joint between floor and wall, Wall with hinged base and free top, Wall monolithic with elastic base and hinged at top.

UNIT-IV(9)

Intz Tank: Elements of Intz tank, Design of top dome, Design of top ring beam, Design of bottom dome, Design of bottom ring beam and Design of conical bottom.

Foundations: Design of raft foundation, Effective length of pile, Reinforcement in piles, Under-reamed piles, Pilecap, Grade beams, Design of pile foundation.

TextBook(s):

[1] N. Subramanian, *Design of Reinforced Concrete Structures*, 2nded., New Delhi: Oxford Higher Education, 2014.

ReferenceBook(s):

[1] N. Krishna Raju, *Advanced Reinforced Concrete Design*, 3rded., New Delhi: PHI Publications, 2014.

[2] P.C. Varghese, *Advanced Reinforced Concrete Design*, 2nd ed., New Delhi: CBS Publishers and Distributors Pvt. Ltd., 2016.

[3] B.C. Punmia, *Reinforced Concrete Structures*, Volume I, II, III and IV, 7th ed., New Delhi: Laxmi Publishing Company, 2008.

[4] IS456, *Code of Practice for Plain and Reinforced Concrete*, New Delhi: Bureau of Indian Standards, 2000

[5] IS875, *Code of Practice for Design Loads – Part 1 to 5*, New Delhi: Bureau of Indian Standards, 2015

[6] IS3370, *Code for Water Tanks – Part 1 to 4*, New Delhi: Bureau of Indian Standards, 2021.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: recommend guide lines for design of dog legged stair case & grid slab

CO2: appraise the importance of retaining wall and their designs

CO3: design and detail types of water retaining structures

CO4: design and reinforcement detailing of foundations

Course Articulation Matrix: U18CE702A ADVANCED STRUCTURAL DESIGN																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE702A.1	2	1	1	1	-	1	-	1	1	1	-	1	1	2	-	-
CO2	U18CE702A.2	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	-
CO3	U18CE702A.3	2	1	1	1	-	1	-	1	1	1	-	1	1	2	-	-
CO4	U18CE702A.4	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	-
U18CE702A		1.5	1.5	1	1	-	1	-	1	1	1	-	1	1.5	1.5	-	-

U18CE702B HYDRAULIC STRUCTURES

Class: B.Tech VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous/Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: diversion head works and design of weirs

LO2: canal fall structure

LO3: regulation work and head regulators

LO4: cross drainage works and siphon aqueducts

UNIT-I (9)

Diversion Head works: Components, layout of diversion head work, weirs and barrages, types of weirs, Bligh's creep theory, Lane's theory and Khosla's theory on design of weirs on permeable foundations, divide wall, fish ladder, under sluice, silt ejectors and silt excluders, upstream and downstream protection measures.

Design of Weir: Vertical Drop Weir – hydraulic calculations for fixing various elevations, design of weir wall, design of impervious aprons, design of inverted filter and downstream talus

UNIT-II (9)

Canal fall: Canal Fall, necessity, location and types of falls, cistern design, design principles of slopping glacis fall.

Design of fall structure: Fall with baffle Wall - baffle platform, baffle wall, cistern, upstream wings, downstream wings, downstream glacis.

UNIT-III (9)

Regulation works: Head regulators and cross regulators, design principles of head regulator and cross regulator.

Design of Head regulators: Head regulator – rest levels, conditions of flow for design, cistern level, length of down stream floor, cut-offs, total floor length, uplift pressures and floor thickness, protection works.

UNIT-IV (9)

Cross drainage works: Types of cross drainage works, necessity and selection, design principles of aqueduct and siphon aqueduct, bank connections, bed and bank protection. River meandering - causes, river training works, groynes and guide banks.

Design of Siphon Aqueduct: Siphon aqueduct – design of drainage waterway, design of canal waterway, design of bed levels, design of transitions, design of trough, and up lift on bottom floor of barrel.

Text Book(s):

[1] S.K. Garg, *Irrigation Engineering and Hydraulic Structures*, 3rd ed. New Delhi: Khanna Publishers, 2019.

Reference Books:

[1] K.R. Arora, *Irrigation, Water Power and Water Resources Engineering*, 3rd ed. New Delhi: Standard Publications, 2002.

[2] B. C. Punmia, *Irrigation and Water Power Engineering*, 16th ed. New Delhi: Standard Publishers, 2009.

[3] G.L. Asawa, *Irrigation Engineering*, 4th ed. New Delhi: New Age Publications, 2005.

U18CE702C SUSTAINABLE MATERIALS AND GREEN BUILDINGS

Class: B.Tech.VII-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1: concepts of sustainability and governing principles

LO2: green and sustainable building materials

LO3: energy and carbon reduction in buildings

LO4: building performance towards sustainability

UNIT-I(9)

Sustainability concepts: Pillars, circle, need, Engineering principles and systems approach to sustainability.

Environmental concerns: Consumption and depletion of natural resources, Land use patterns, Climate change, Global warming, National and International policies, and regulations of sustainability.

UNIT-II(9)

Sustainable building materials: Materials, qualities, uses, natural building materials, locally available and manufactured materials, biomaterials, salvaged and recycled materials, nontoxic materials: low volatile organic compound (VOC) paints coating and adhesives.

Selection of sustainable materials: Challenges in selecting green materials, pragmatic view of green materials, priorities in selection process, Life cycle assessment of building materials, Sustainable concrete production.

UNIT-III (9)

Energy and carbon reduction: Building energy issues, High performance building design strategy, goal setting for high performance, Passive design strategy—shape, orientation, and massing, lighting, ventilation, passive cooling, composite beam and panel, funicular shells, fillers labs, reinforced concrete masonry, vaulted roofs, Ferro-cement walls.

Applications in the built environment: Concepts of green buildings, climate responsive building, Indoor Environmental Quality (IEQ), issues, factors, Acoustics transmission, Lighting quality, Thermal comfort conditions, Odours, Volatile Organic compounds, Humidity, Integrated IEQ.

UNIT-IV(9)

Indian green building rating systems: Sustainable Buildings, Green building rating systems: IGBC and GRIHA tools for building assessment, Codes and regulations for green building.

Future of sustainable buildings: Business case of high performance green buildings, Design and construction strategies, Reinventing the construction industry, challenges and opportunities.

TextBooks:

[1].C.J. Kibert, *Sustainable Construction Green Building Design and Delivery*, 3rded. Canada: John Wiley & Sons, 2014. (Chapters 4,6,7,8,9,11,12,13&15)

[2].S.Goodhew, *Sustainable Construction Processes*, 1sted. London: John Wiley & Sons, 2016. (Chapters 1-9)

Reference Books:

[1].ISO 15392 *Sustainability in Buildings and civil engineering works— General Principles*, 2nded, 2019

[2].G.M.Sabnis, *Green Building with concrete—sustainable design and construction*, 1sted. London: CRC Press, 2016.

[3].G.S.Kainth, *Climate Change, Sustainable Development and India*, LAP Lambert Academic Publishing, 2011.

[4]. *Sustainable Building-Design Manual Part 1&2*, The Energy and Resources Institute, TERI, 2004.

- [5]. L.Reeder, *GuidetoGreenBuildingRatingSystems:UnderstandingLEED, GreenGlobes*, JohnWiley&Sonspublisher2010.
 [6].M.Robertson, *SustainabilityPrinciplesandPractice*, 2nded. London:Routledgepublisher, 2014.
 [7]. T.R.Rider, S.Glass, J.McNaughton, *UnderstandingGreen BuildingMaterials*, W.W.Norton andCompany, 2011.
 [8].C.Cameselle, J.A.Adams, and K.R.Reddy, *SustainableEngineering:Drivers, Metrics, Tools, andApplications*, 1sted. US: JohnWiley&Sons, 2019.

Course Research Papers : Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage

Course Patents: Patents 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 Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (Cos):

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

CO1: infer the significance of sustainability in construction engineering

CO2: appraise and select sustainable building materials

CO3: interpret the energy and carbon reduction strategies

CO4: rate and propose sustainable building

Course Articulation Matrix:U18CE702C SUSTAINABLE MATERIALS AND GREEN BUILDINGS																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE702C.1	1	-	1	-	-	1	1	1	1	1	-	1	-	2	1	-
CO2	U18CE702C.2	1	-	1	-	-	1	1	1	1	1	-	1	-	2	1	1
CO3	U18CE702C.3	1	-	2	-	-	1	1	1	1	1	-	1	-	2	1	1
CO4	U18CE702C.4	1	-	2	-	2	1	1	1	1	1	-	1	-	2	1	1
U18CE702C		1	-	1.5	-	2	1	1	1	1	1	-	1	-	2	1	1

U18CE703A STRUCTURAL DYNAMICS

Class: B.Tech.VII Semester

Branch: Civil Engineering

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40marks
EndSemesterExamination	60marks

Course Learning Objectives:

This course will develop student's knowledge in/on

LO1: *theory of vibration related to dynamic motion*

LO2: *single and multi-degree freedom system*

LO3: *analysis of forced vibration on discrete and continuous systems*

LO4: *earthquake effect on structures*

UNIT-I(9)

Theory of Vibrations: Elements of vibratory system, degrees of freedom, oscillatory motion, simple harmonic motion, free vibrations of single degree of freedom system, un-damped and damped vibrations, critical damping, logarithmic decrement.

Fundamentals of Structural Dynamics: Objectives of dynamic analysis, types of prescribed loading, methods of discretization, formulation of equations of motion by different methods, direct equilibration using Newton's law of motion/D'Alembert's principle.

UNIT-II(9)

Single Degree of Freedom Systems: Formulation and solution of the equation of motion, free vibration response, response to harmonic, periodic, impulsive and general dynamic loadings.

Multi Degree of Freedom Systems: Selection of the degrees of freedom, evaluation of structural property matrices, formulation of the MDOF equations of motion, un-damped free vibrations, solutions of Eigen value problem for natural frequencies and mode shapes, analysis of dynamic response, orthogonal properties of normal modes.

UNIT-III(9)

Vibration Analysis of single degree freedom systems: Stodola's method, fundamental mode analysis.

Vibration Analysis of Multi degree freedom systems: Vibration of two and multi degree of freedom systems, concept of normal mode, free vibration problems and determination of natural frequencies.

UNIT-IV(9)

Application of I.S. Code method: I.S. Code method of analysis, seismic coefficient method.

Continuous Systems: Flexural vibrations of beams, elementary case, derivation of governing differential equation of motion, analysis of un-damped free vibrations of beams in flexure, natural frequencies and mode shapes of simple beams with different end conditions.

Textbook:

[1]. M. Paz, *Structural Dynamics*, 3rd ed., New Delhi: C.B.S Publishers, 2009.

Reference Books:

[1]. R.W. Clough, J. Penzien, *Dynamics of Structures*, 3rd ed., New York: McGraw Hill, 2013.

[2].K.A.Chopra, *Dynamics of Structures*, 5th ed., New Delhi: Pearson Education (Singapore), 2020.

[3].I.S:1893-2002, *Code of practice for Earthquake resistant design of Structures*, 5th Rev., New Delhi, Bureau of Indian Standards, 2016.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: *apply the theory of vibrations to structural elements*

CO2: *evaluate the response for single and multi-degree of freedom system*

CO3: *apply the vibration analysis to beams*

CO4: *appraise methods of earthquake analysis*

Course Articulation Matrix: U18CE703A STRUCTURAL DYNAMICS																	
CO		PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE703A.1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO2	U18CE703A.2	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO3	U18CE703A.3	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO4	U18CE703A.4	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
U18CE703A		1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1

U18CE703B FOUNDATION ENGINEERING

Class:B.Tech.VII-Semester

Branch: Civil Engineering

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: site investigation and shallow foundations

LO2: deep foundations and caissons

LO3: foundation on expansive soils and analysis of slope stability

LO4: earth pressures and machine foundations

UNIT - I (9)

Site investigation: Types of exploration, Types of samplers, Standard penetration test, Static and dynamic cone penetration tests, Plate load test, Types of foundations, Types of loads on foundations, Choice of foundations.

Shallow foundations: Bearing capacity - Definitions and theories - Terzaghi, Meyerhof, Skempton and Vesic, Terzaghi's bearing capacity equation, Effect of size, shape, ground water table, depth of embedment and load inclination on bearing capacity, Field determination of bearing capacity, Settlement of foundations, Elastic settlements, Permissible settlements.

UNIT - II (9)

Deep foundations: Pile Foundations - Classification of piles, Load bearing capacity of piles, Static formulae, Negative skin friction, Dynamic formulae, Engineering News Record (ENR) and Hiley's formulae, Pile load tests, Group action of piles, Pile groups in sand, gravel and clay, Settlement of pile groups.

Caissons: Types of well foundations, Construction of well foundation, Sinking of open wells, Pneumatic caissons, Box caissons and rectification methods.

UNIT-III(9)

Foundations on expansive soils: Identification and problems, Design considerations, Underreamed piles.

Slope stability analysis: Infinite and finite slopes, Types of slope failures, Factors of safety, Stability analysis of finite slope by Swedish and Friction circle methods, Taylor's stability number, Stability analysis of earth dams.

UNIT - IV (9)

Earth pressures: Types of lateral earth pressure - Active, at rest and passive earth pressure, Rankine's and Coulomb's earth pressure theories, Culmann's graphical solution.

Machine foundations: Types, Degree of freedom of block foundation, Design parameters for field methods, Cyclic plate load test, Block vibration test, Design criteria and detailing, Vibration analysis.

Text Book:

[1] K. R. Arora, *Soil Mechanics and Foundation Engineering*, 9th ed. New Delhi, Standard Publishers, 2013.

Reference Books:

[1] Srinivasulu and Vaidyanathan, *Hand book of Machine Foundations*, 1st ed. New Delhi, Tata Mc Graw Hill Publications, 2013.

[2] R. Shenbaga Kaniraj, *Design Aids in Soil Mechanics and Foundation Engineering*, 1st ed. New Delhi, Tata Mc Graw Hill Education Private Ltd., 2017.

[3] K. Shashi Gulhati, Manoj Datta, *Geotechnical Engineering*, 18th ed. New Delhi, Mc Graw hill Publications, 2014.

Course Research Papers: Research papers (Journal/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):

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

CO1: appraise site conditions and shallow foundations

CO2: estimate the bearing capacity of soils and foundation settlements

CO3: interpret expansive soils and examine the stability of slopes

CO4: assess earth pressures and design machine foundations

Course Articulation Matrix: U18CE703B Foundation Engineering																	
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE702B.1	1	2	-	-	-	1	-	1	1	1	-	1	1	-	-	1
CO2	U18CE702B.2	1	2	-	-	-	1	-	1	1	1	-	1	1	-	-	1
CO3	U18CE702B.3	1	2	2	1	-	1	-	1	1	1	-	1	1	2	-	1
CO4	U18CE702B.4	1	2	2	1	-	1	-	1	1	1	-	1	1	2	-	1
U18CE702B		1	2	2	1	-	1	-	1	1	1	-	1	1	2	-	1

U18CE703C REPAIR AND REHABILITATION OF STRUCTURES

Class:B.Tech.VII-Semester

Branch : Civil Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

ContinuousInternal Evaluation	40marks
EndSemesterExamination	60marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1: maintenance and deterioration of concrete structures

LO2: evaluation and non-destructive tests on concrete structures

LO3: essential parameters for repair material and selection of repair materials

LO4: repair techniques and health monitoring of concrete structures

UNIT-I(9)

Maintenance and Inspection: Importance and requirement of maintenance, category of inspection and maintenance, aspects and periods of inspection, preliminary, detailed and rapid visual inspection, overview of maintenance of buildings.

Deterioration of concrete structures: Site survey, need for repair and rehabilitation, disintegration of RCC Structures, major causes and signs of deterioration- Accidental loading, chemical reactions, corrosion, freezing and thawing, settlement, movement, shrinkage, temperature changes, durability and permeability aspects, cracks, types, causes and characteristics.

UNIT-II(9)

Evaluation of concrete structures: Condition evaluation of RCC structures, objective and stages of condition assessment.

In-situ and Laboratory testing of concrete: Nondestructive and semi destructive tests for strength assessment-Reboundhammer test, Ultrasonic Pulse Velocity (UPV), core sampling and testing, chemical tests – carbonation test, chloride content, corrosion potential assessment- cover meter survey, half cell potential test, breakoff test and Penetration test.

UNIT-III(9)

Essential Parameters for Repair Materials: Low Shrinkage, requisite setting/hardening properties, workability, bond with the substrate, compatible coefficient of thermal expansion, compatible mechanical properties & strength, minimal or no curing requirement, alkalinity, low air & water permeability, aesthetics, cost, durability, non-hazardous/non-polluting.

Materials for Repair: Premixed cement concrete / mortars, Polymer modified mortars and concrete (PMM/PMC), Epoxies and Epoxy systems including Epoxy mortars/concretes, polyester resins, surface coatings, micro concrete.

UNIT-IV (9)

Repair Techniques: Repairs using mortars, shotcrete, concrete replacement, epoxy bonded concrete, silica fume concrete, polymer concrete system, resin modified cement slurry injection, Ferro-cement, plate bonding, fiber wrap technique, RCC Jacketing, repair/strengthening columns, beams and slabs, seismic retrofitting, crack stitching and gravity filling.

Structural Health Monitoring and Demolition of Buildings: System components, classification and process of Structural Health Monitoring, dilapidated structures, demolition planning, techniques, sequence and precautionary measures.

TextBooks:

[1] P. Modi, C. Patel, *Repair and Rehabilitation of Concrete Structures*, 1st ed., New Delhi, PHI Learning Pvt.Ltd.,2019.

ReferenceBooks:

[1] Central Public Works Department (CPWD), *Handbook on Repair and Rehabilitation of R.C.C Buildings*, New Delhi, Government of India, 2002.

- [2] J.Bhattacharjee, Concrete Structures- Repair, Rehabilitation and Retrofitting, 1st ed., New Delhi, CBS Publishers and Distributors Pvt. Ltd., 2017.
- [3] R.N.Raikar, Diagnosis and treatment of structures in distress, 1st ed., Mumbai, R and D Centre of Structural Designers and Consultants Pvt. Ltd., 1994.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 Learning Outcomes (COs):

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

CO1: appraise importance and need for rehabilitation and maintenance of structures

CO2: evaluate strength of concrete through non destructive and semi destructive tests

CO3: perceive essential parameters of repair materials and their selection

CO4: develop repair methods and monitor concrete structures

Course Articulation Matrix (CAM): U18CE703C REPAIR AND REHABILITATION STRUCTURES																	
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE703C.1	2	2	-	2	2	1	1	1	1	1	-	1	2	-	-	1
CO2	U18CE703C.2	2	2	-	2	2	1	1	1	1	1	-	1	2	-	-	1
CO3	U18CE703C.3	2	2	-	2	2	1	1	1	1	1	-	1	2	-	-	1
CO4	U18CE703C.4	2	2	-	2	1	1	1	1	1	1	-	1	2	-	-	1
U18CE703C		2	1	-	2	2	1	1	1	1	1	-	1	2	-	-	1

U18CE704 HIGHWAY ENGINEERING

Class: B.Tech.VII – Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: *development and geometric design of highways*

LO2: *traffic flow characteristics and traffic studies*

LO3: *highway materials, design of flexible, rigid pavements*

LO4: *maintenance, evaluation and highway drainage*

UNIT – I (9)

Highway Development: Development of road construction, development in India, planning surveys and interpretation, alignment, engineering surveys for alignment.

Geometric Design of Highway: Cross section elements, Sight distance – stopping sight distance, overtaking sight distance and intermediate sight distance, Design of horizontal alignment – design speed, horizontal curve, super elevation, radius of horizontal curve, widening of pavement, transition curves, Design of vertical alignment – gradient, vertical curves.

UNIT – II (9)

Traffic Flow: Characteristics- relation between speed, flow and density, traffic capacity, level of service (LOS), factors affecting capacity and LOS, Traffic Control-purpose of traffic signal, signal warrants, Signal design – Webster's method, IRC method.

Traffic Studies: Traffic volume studies, spot speed studies, speed and delay studies, origin and destination studies, parking studies.

UNIT – III (9)

Pavement Materials: Soil-Index properties, classification, CBR, compaction, sub-grade soil strength, Aggregate – desirable properties, tests on road aggregates, Bituminous binders-types, tests on bitumen, grading of bitumen, Bituminous mixes-requirements, constituents, design, Pavement quality concrete-materials and requirements.

Pavement Design: Types, components and functions, factors, design of flexible and rigid pavements using IRC method, water bound macadam, dense bituminous macadam.

UNIT – IV (9)

Pavement Maintenance and Evaluation: Classification of highway maintenance, Distresses in flexible pavements and maintenance measures, Structural evaluation of flexible pavements, Pavement overlay design using benkelman beam deflection method, distresses in rigid pavements and maintenance measures, road safety audit process, principles of road safety.

Highway Drainage: Requirements and importance of highway drainage, Surface and subsurface drainage, Collection of surface water, Design aspects of surface drainage system – hydrologic analysis and hydraulic analysis, sub-surface drainage measures.

Text book:

[1]. S. K. Khanna, C. E. G. Justo, A. Veeraraghavan, *Highway Engineering*, 10thed., Roorkee: Nem Chand & Bros, 2015.

Reference Books:

- [1]. E. J. Yoder and M. W. Witezak, *Principles of Pavement Design*, 2nded., New York: John Wiley & Sons, Inc., 2012.
- [2]. L. R. Kadiyali, *Principles of Highway Engineering*, 9thed., New Delhi: Khanna Publishers, 2017.
- [3]. Yang. H. Huang, *Pavement Analysis and Design*, 2nded., New Jersey: Pearson Prentice Hall, 2008.
- [4]. IRC 37 (2018): *Guidelines for the Design of Flexible Pavements*.
- [5]. IRC 58 (2015): *Guidelines for the design of plain jointed rigid pavements for highways*.
- [6]. IRC 81 (1997): *Guidelines for Strengthening of Flexible Road Pavements using Benkelman Beam Deflection Technique*.
- [7]. IRC SP 88 (2019): *Manual on Road Safety Audit*
- [8]. MoRTH code: *Fifth revision* (2013)

Course Research Papers: Research papers (Journal/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, the students will be able to...

CO1: summarize highway planning and geometric design elements

CO2: design the signal time using traffic flow characteristics

CO3: recommend suitable highway materials & design flexible and rigid pavement

CO4: analyze pavement failures, overlays and highway drainage

Course Articulation Matrix: U18CE704 HIGHWAY ENGINEERING																	
	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE704.1	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-	1
CO2	U18CE704.2	2	1	1	1	-	1	-	1	1	1	-	1	2	1	-	1
CO3	U18CE704.3	2	1	1	1	-	1	-	1	1	1	-	1	2	1	-	1
CO4	U18CE704.4	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-	1
U18CE704		2	1	1	1	-	1	1	1	1	1	-	1	2	1	-	1

U18CE705 HIGHWAY ENGINEERING LABORATORY

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

Examination Scheme:

L	T	P	C
-	-	3	2

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

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

LO1: properties of aggregate for pavements

LO2: properties of bitumen

LO3: marshall mix design

LO4: traffic volume and traffic speed

LIST OF EXPERIMENTS

1. Determination of abrasion value for aggregate
2. Determination of impact value for aggregate
3. Determination of shape indices for aggregate
4. Determination of specific gravity of aggregate & bitumen
5. Determination of sand equivalent value test and soundness test on aggregates
6. Determination of ductility value and flash point for bitumen
7. Determination of softening point and penetration value for bitumen
8. Determination of absolute and kinematic viscosity tests for bitumen
9. Determination of bitumen extraction test
10. Determination of flow value through Marshall stability test
11. Determination of peak hour volume through traffic volume studies
12. Demonstration for evaluation of traffic speed
13. Demonstration on Road Safety of Intersection Design
14. Demonstration on Design of 4-legged rotary intersection

Laboratory Manual:

- [1]. "Highway Engineering Laboratory Manual", prepared by faculty of Department of Civil Engineering.

Text books:

- [1]. S. K. Khanna, C. E. G. Justo, A.Veeraragavan, *Highway Material Testing*, Roorkee: Nem Chand and Bros Publications, 2014.

Course Learning Outcomes (Cos):

After completion of the course, the student will be able to...

CO1: judge the properties of aggregates

CO2: recommend grade of bitumen for pavement construction

CO3: design bituminous mix using Marshal method design

CO4: predict the vehicular traffic behavior

Course Articulation Matrix (CAM): U18CE8705 - HIGHWAY ENGINEERING LABORATORY

CO		PO 1	PO 2	PO 3	P 04	P 05	P 06	P 07	P 08	P 09	PO 10	PO 11	PO 12	PS 01	PS 02	PS 03	PS 04
CO1	U18CE705.1	2	-	-	-	-	1	-	1	1	1	-	1	2	-	-	1
CO2	U18CE705.2	2	-	-	-	-	1	-	1	1	1	-	1	2	-	-	1
CO3	U18CE705.3	2	-	1	-	-	1	-	1	1	1	-	1	2	1	-	1
CO4	U18CE705.4	2	1	-	-	-	1	-	1	1	1	-	1	2	1	-	1
U18CE705		2	1	1	-	-	1	-	1	1	1	-	1	2	1	-	1

U18CE706 CIVIL ENGINEERING SOFTWARE APPLICATIONS LABORATORY

Class: B.Tech. VII – Semester

Teaching Scheme:

L	T	P	C
-	-	2	1

Branch: Civil Engineering (CE)

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

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

LO1: structural elements using STAAD Pro

LO2: horizontal alignment, rail-tracking placing and flexible and rigid airfield pavements

LO3: water hammer analysis and water distribution system

LO4: soil bearing capacity and pile load capacity

LIST OF EXPERIMENTS

1. Analysis and design of RCC beams using STAAD.Pro and validation by manual method.
2. Analysis and design of RCC columns using STAAD.Pro and validation by manual method.
3. Analysis and design of RCC slabs using MS Excel / MAT LAB and validation by manual method.
4. Analysis and design of Isolated RCC footings using STAAD Foundation Advanced and validation by manual method.
5. Analysis and design of steel beams using STAAD.Pro and validation by manual method.
6. Analysis and design of steel columns using STAAD.Pro and validation by manual method.
7. Analysis and design of roof truss using STAAD.Pro and validation by manual method.
8. Design of horizontal alignment using MX road.
9. Design of rail track- placing and connecting turnouts by using In-Roads software.
10. Design of flexible and rigid airfield pavements using FAARFIELD.
11. Analysis of water hammer in a pipe using EPANET/BENTLEY (HAMMER)
12. Building a water distribution system using EPANET/BENTLEY (WaterGEMS)
13. Determination of soil bearing capacity using MS Excel/MAT LAB.
14. Determination of pile load capacity using MS Excel/MAT LAB.

Laboratory Manual:

- [1]. *Civil Engineering Software Applications Laboratory Manual*, prepared by the faculty of Civil Engineering.

Textbook:

- [1]. *Manual of STAAD.Pro V8i*, Bentley Software.
[2]. *Manual of MX Roads*, Bentley Software.
[3]. *Manual of In-Roads*, Bentley Software.
[4]. *Manual of FAARFIELD*.
[5]. *Manual of EPANET/ HAMMER, WaterGEMS*, Bentley Software.
[6]. S. U. Pillai, D. Menon, *Reinforced Concrete Design*, 3rd ed., New Delhi: Tata McGraw-Hill Publishing Company Limited, 2011.

- [7]. S. S. Bhavikatti, *Design of Steel Structures: By Limit State Method as Per IS: 800-2007*, 3rd ed., New Delhi: International Publishing House Pvt. Ltd., 2012.
- [8]. S. K. Khanna, C. E. G. Justo, A. Veeraraghavan, *"Highway Engineering"*, 10th ed., Roorkee: Nem Chand and Bros., 2014.
- [9]. K. R. Arora, *"Soil Mechanics and Foundation Engineering"*, 9th ed., New Delhi: Standard Publishers, 2013.
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Course Learning Outcomes (COs):

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

CO1: *design structural elements using STAAD Pro*

CO2: *propose horizontal alignment, rail-tracking placing and flexible and rigid airfield pavements*

CO3: *demonstrate water hammer and water distribution system*

CO4: *calculate soil bearing capacity and load capacity of piles*

Course Articulation Matrix: U18CE706 Civil Engineering Software Applications Laboratory																	
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE706.1	1	1	2	-	1	1	-	1	1	1	1	1	1	1	1	1
CO2	U18CE706.2	1	1	2	-	1	1	-	1	1	1	1	1	1	1	1	1
CO3	U18CE706.3	1	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1
CO4	U18CE706.4	1	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1
U18CE706		1	1	1.50	-	1	1	-	1	1	1	1	1	1	1	1	1

U18CE707 : MAJOR PROJECT WORK PHASE-I

Class: B.Tech. VII - Semester

Branch: Civil Engineering

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...

LO5: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques

LO6: 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

LO7: ethics, team work and project management skills such as budgeting, scheduling

LO8: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

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.

- 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.
- Team work:** Major project work is a team work.
 - The students of a project team shall work together to achieve a common objective.
 - 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.
- 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 completed in 8th semester as *Phase-II*.
- 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.
- Major project work Phase-I: 7th semester**
 - 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) <i>One coordinator for each section</i>
Three Faculty members	Section-wise faculty members <i>Three faculty members for each section representing various specializations. (Five specializations will be covered including the coordinator's and Convener's)</i>

- Major project allotment to students during last working week of 6th semester:**

- 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 reviewed journal
- (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 environmental Considerations
 - (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 leader in 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 guide students on**
- (a) **Meeting Cadence:**
 - i. **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.
 - 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.
 - i. 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.).
 - ii. 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.
 - iii. 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.
 - iv. Log books are to be shown during all presentations and will be graded along with the project.
 - v. 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 made during 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 with supervisor 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-predatory conference/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 major project 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 as part 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 the activity 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 progress presentation-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*)
- (c) **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.

(ix) 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	B. DPEC Assessment	20%
(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

- (a) **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*.
- (b) **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.
 - a. **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

- (c) **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
- be 3 to 5-minute-long video (no longer than 5 minutes)
 - be concise and to the point, on the problem and proposed solution
 - show project timeline and sample page of log book
 - 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
 - discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts*.
 - emphasize key points about *business idea, potential market for the proposed solution*
- (x) It is mandatory for
- every student of the team to *appear for oral presentation and viva-voce*, as part of progress presentation -I to qualify for course evaluation
 - 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
 - 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
- (xi) A student shall register for supplementary examination for the Major project work *phase-I* in the following cases:
- He/she is absent for oral presentation and viva-voce as part of progress presentation-I
 - The project team fails to submit the progress report on *phase-I* in prescribed format
 - The project team fails to submit the video pitch on the progress made during the *phase-I* period.
 - he/she fails to fulfill the requirements of Major project work *phase-I* evaluation as per specified guidelines
- (xi) Supplementary examination for Major project work *phase-I*
- The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned
 - The DPEC, duly constituted by the HoD, shall conduct Major project phase-I supplementary exam and 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) : U18CE707 MAJOR PROJECT WORK PHASE-I																	
CO	CO Code	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	U18CE707.1	2	2	2	2	-	-	-	3	-	2	-	3	2	2	-	-
CO2	U18CE707.2	2	2	2	-	2	2	2	3	-	-	-	3	2	2	-	-
CO3	U18CE707.3	-	-	-	-	-	-	-	3	2	-	2	3	-	-	2	2
CO4	U18CE707.4	-	-	2	2	-	-	-	3	-	2	-	3	-	-	2	2
U18CE707		2	2	2	2	2	2	2	3	2	2	2	3	2	2	2	2

U18CE708 INTERNSHIP EVALUATION

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
6 - 8 weeks internship			

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

The internships will develop student interns' knowledge in real-world or industry environment in/on

LO1: *pre-employment training opportunities, career information and employability-enhancement skills*

LO2: *communication and personal development skills*

LO3: *critical thinking and problem-solving skills*

LO4: *professionalism / work ethics and teamwork / collaboration in real organizational setting*

Mandatory Internships:

1. The internships provide exposure to the real-world, get a feel for the work environment and how a professional workplace operates.
2. During the internship, students will experience a real-life engineering workplace and understand how their engineering and professional knowledge, skills and qualities (KSQs) can be utilized in industry.
3. Students can learn, more importantly, how to apply the KSQs they have acquired during an internship to their future workplaces.
4. Students will also be able to demonstrate functioning engineering knowledge, both new & existing, and identify areas of further development for their future careers.
5. Internships give the student an opportunity to bridge theory and practice
6. Internships also provide students with the soft skills needed at workplace and leadership positions.
7. The internship guidelines are governed by the rules stipulated in the Institute's Internship policy-2020 document.
8. The students shall have to undergo 6-8 weeks of mandatory internship during summer/winter vacation at industry/R&D organization / Academic Institutes like IITs, IIITs& NITs.
9. HoD, along with Prof i/c internships, shall address students (*of 2nd, 4th and 6th semesters*) during last week of even semester of every academic year on the following
 - a. creating awareness on mandatory 6-8 weeks internship by every student
 - b. creating awareness on COs of internships
 - c. KSQs the students would acquire doing internships
 - d. expected internship outcomes
 - e. available internship options, and organizations offering internships
 - f. progressively completing 6-8 weeks internship by the end of 6th semester summer, starting from 2nd semester summer break.
 - g. internship evaluation in 7th semester
 - h. internship report submission and oral presentation (through PPT) by student
10. Students undergoing the internship shall be required to submit their details to the department internship coordinators of the respective branches. He will coordinate all the internship activities of the students of that department.
11. Students have to submit a signed undertaking to the department internship coordinator for demonstrating honesty, integrity, professionalism and regular attendance at work place to add value to the organization where the internship is allotted. Students also have to uphold the professional image of our institute.

12. In case, a student is found to violate the internship rules and regulations, the student will have to produce a valid reason for the violation of internship rules. Without a valid reason, the student will be debarred from taking part in subsequent placement activities of the institute.
13. 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.
14. 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).
15. The student learning assessment process (SLAP): The SLAP in internships shall include feedback from internship supervisor, submission of internship report on the complete internship and PPT presentation.
16. Internship Log Book: The activity journaling in a log book is very important for a successful internship.
 - a. The internship supervisor identifies the work goals at the beginning of the internship
 - b. Student has to maintain internship log book, where in the activities undertaken during internship and timely submission at periodic intervals are to be documented.
 - c. At the conclusion of the internship, the supervisor shall specifically comment, in the internship log book, on whether the student met each of the work goals and to give evidence which describes the quality of work. For student, this also serves as a self-assessment.
 - d. Internship log book (*with due signatures of the internship supervisor*) shall be considered for evaluation during presentation, i.e., number of planned meetings with internship supervisor and number attended by student
17. Meeting Cadence:
 - i. **Regular meetings with internship supervisor:** Regular meetings with the internship supervisor to discuss work goals and review the status of activities undertaken are very essential. Student shall participate in discussions and take notes.
 - ii. **Meeting Frequency:** The meeting cadence, i.e., *meeting frequency* shall be fixed in consultation with the internship supervisor and accordingly student has to participate in discussions and take notes. Take signatures of internship supervisor as per the planned cadence in the internship log book.
18. The internship evaluation shall be done by **department internship evaluation committee (DIEC)** based on the submitted report by student and oral presentation.
19. There shall be only Continuous Internal Evaluation (CIE) for internship evaluation.
20. CIE for the Internship evaluation in VII semester shall be as below:

Internship evaluation	Weightage
A. Internship Supervisor's Assessment (i) <i>Feedback from the internship supervisor</i> - on completion of internship assignment / work (20%) (ii) <i>Feedback from the internship supervisor</i> - on quality of work in internship assignment / work (10%) (iii) <i>Feedback from the internship supervisor</i> - internship log book (10%) (iv) <i>Feedback from the internship supervisor</i> - on attendance, punctuality and work hours (10%) (For the case of 6-8 weeks internship done in more than one spell, it will be average of all the internship supervisors' assessment)	50%
B. DIEC Assessment (i) <i>Internship duration (8 /6 weeks) (15% / 10%)</i> (ii) <i>Internship Report (20%)</i> (iii) <i>Oral Presentation (with PPT) and viva voce (15%)</i>	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. In case of completing the 6-8 weeks internship in more than one organization, the student shall be required to prepare separate softbound internship reports signed by the internship supervisor(s) along with the seal(s) of the organization(s). The student shall submit two final softbound internship reports along with a soft copy, keeping all the certificate(s) issued by the internship supervisor(s) and all the individual internship reports cleared by respective internship supervisor. The Chapter-1 of the final internship report shall clearly describe the following indicating overall summary.
- (i) **Internship(s) attended:** A table with name & address of organization, organization's vision and mission, internship weeks attended, internship period (exact dates attended), internship supervisor, head of the section and head of the organization
 - (ii) **Duties/tasks during internship(s):** Table describing name & address of organization, and the duties / tasks undertaken during internships. This indicates what opportunities and learning experiences the interns got to get hands-on experience on a wide range of KSQs of a professional engineer.
 - (iii) **Tangible outcomes of internship:** These are the lessons learnt from internship experience. The students have to describe in their own words what they learnt from the internship experience. The student has to describe what specific KSQs are acquired by him, with reference to the expected internship COs, after successful completion of internship(s). Finally, a table depicting systematic mapping of what they have learnt and the expected internship COs, is to be shown
 - (iv) **Student feedback on internship:** To gather information on whether internship 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 report.
 - (v) **Pictures at the worksite:** Student has to keep, in the report, his working pictures at the worksite, discussing with the internship supervisor, the creative project he is working on, or an event he is attending for work, group photo of the team/section/department he worked with.
- (b) Anti-Plagiarism Check:** The internship report should clear plagiarism check as per the Anti-Plagiarism policy-2020 of the institute.
- (c) Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the DIEC as per the schedule notified by the department. The presentation shall compulsorily have slides on the points mentioned in (a)(i)-(v)
- (d)** It is mandatory for every student to *appear for oral presentation(with PPT) and viva-voce*, to qualify for internship evaluation
- (e)** 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
- (f)** Supplementary examination for internship evaluation
- (i) The CoE shall send the list of students, registered for supplementary examination, to the HoD 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

Course Learning Outcomes (COs):

Upon completion of the internship, student interns will be able to...

CO5: *gain career awareness, company/industry/workspace related knowledge, skills and work experience to add to resume, employer expectations for workplace behaviours; explore career alternatives prior to graduation; initiate and build a professional network and acquire employment contacts leading directly to a full-time job following graduation from institute; apply practice-oriented 'hands-on' interdisciplinary working experience in the real world or industry to solve real life challenges in the workplace by integrating academic theory and practice and analysing work environment and conditions; commitment to quality and continuous improvement; integrate internship experience with academic plan and articulate career options (Career information and employability-enhancement skills)*

- CO6:** receive and interpret messages in the communication; present thoughts and ideas clearly and effectively in oral, written, computer-based, graphical forms as required for particular workplace settings; collaborate effectively and appropriately with different professionals in the work environment; demonstrate time management, planning, independence, professional judgement and positive attitudes (self-reliance & self-confidence, openness, respect, proactive attitude, conscientiousness)(**Communication and personal development skills**)
- CO7:** review research literature, apply the knowledge of science, mathematics, and engineering with higher order cognitive skills to solve real-world problems and impact of solutions in society, environment and sustainability contexts; integrate existing and new technologies for industrial application; conduct investigations of problems; demonstrate analytical skills, including the ability to understand information and interpret data; exhibit foresight, independent thinking, resourcefulness, and the ability to make decisions; design systems, devices and components as needed and use the right tool (e.g., strategy, system, technology, etc.) for the right task (**Critical thinking and problem solving skills**)
- CO8:** demonstrate effective leadership with work ethics including time management, punctuality, honesty, integrity, personal accountability, adaptability; work effectively in teams and real multidisciplinary organizational settings; interact respectfully with all people and understand individuals' differences; build professional relationships with interpersonal skills; maintain a sense of commitment to professional, ethical and social responsibilities; engage on life-long learning of technologies through critical reflection of internship experiences and the KSQ of a professional engineer (**Professionalism / Work ethic and Teamwork / Collaboration**)

Course Articulation Matrix (CAM) :U18CE708 INTERNSHIP																	
CO	CO code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE708.1	3	-	-	-	-	3	-	3	-	-	3	3	2	2		
CO2	U18CE708.2	-	-	-	-	-	-	-	3	-	3	3	3	2	-	2	2
CO3	U18CE708.3	3	3	3	3	3	3	3	3	-	-	3	3	2	2	2	2
CO4	U18CE708.4	-	-	-	-	-	-	-	3	3	-	3	3	2	2	2	2
U18CE708		3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2



KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARRANGAL
(An Autonomous Institute under Kakatiya University, Warangal)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EVALUATION
VIII SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

URR-18R22

Sl.No	Category	CourseCode	CourseTitle	Periods/week			Credits	EvaluationScheme					
				L	T	P		C	CI			ESE	Total Marks
									TA	MS	Total		
1	PE	U18CE801	ProfessionalElective-V/MOOC-V	3	-	-	3	10	30	40	60	100	
2	PE	U18CE802	ProfessionalElective-VI/MOOC-VI	3	-	-	3	10	30	40	60	100	
3	OE	U18OE803	OpenElective-IV /MOOC-VII	3	-	-	3	10	30	40	60	100	
4	PROJ	U18CE804	MajorProject-Phase-II	-	-	14	7	40	-	40	60	100	
Total:				9	-	14	16	70	90	160	240	400	
Additional Learning*: Maximum credits allowed for Honours / Minor				-	-	-	7	-	-	-	-	-	
Total credits 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=Practical's & C=Credits] Total Contact Periods / Week: 23 Total Credits: 16

Professional Elective-V/MOOC-V: U18CE801A: Prestressed Concrete U18CE801B: Railway and Airport Engineering U18CE801C: Construction Contracts Management U18CE801M: MOOCs	Professional Elective-VI/MOOC-VI: U18CE802A: Earthquake Resistant Design of Structures U18CE802B: Earth Retaining Structures U18CE802C: Bridge Engineering U18CE802M: MOOCs	Open Elective-IV/MOOC-VII: U18OE803A: Operations Research U18OE803B: Management Information Systems U18OE803C: Entrepreneurship Development U18OE803D: Forex and Foreign Trade U18OE803M: MOOCs
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U18CE801A PRESTRESSED CONCRETE

Class: B.Tech. VIII-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (Los):

This course will develop students' knowledge in/on

LO1: pre stressed concrete and pre stressing systems

LO2: losses of pre stress and analysis of pre stressed concrete sections

LO3: design of sections in flexure and shear

LO4: transfer of pre stress and its methods

UNIT-I(9)

Elements of Pre stressed concrete: Historical development, concepts of pre-stressing, terminology, advantages, applications of pre stressed concrete, pre-tensioning and post-tensioning.

Pre stressing Systems: Hoyer, Freyssinet, Magnelblaton and Lee-Mc call system, material properties, need for high strength steel and high strength concrete.

UNIT-II(9)

Analysis of Sections: Stress, strength, load balancing concepts, effect of loading on the tensile stresses in tendons, effect of tendon profile on deflections, factors influencing deflections, calculation of short term and long-term deflections.

Losses in Prestress: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of steel, slip in anchorage, bending of member and frictional loss.

UNIT-III(9)

Design for Flexure: Allowable stresses, elastic design of simple beams having rectangular and I-section for flexure, kern lines, cable profile and cable layout.

Design for Shear: Shear and principal stresses, shear improvement techniques, horizontal, sloping and vertical pre stressing, analysis of rectangular beam and I-section, design of shear reinforcement, Indian code provisions.

UNIT-IV(9)

Transfer of Prestress: Transmission of prestressing force by bond, transmission length, flexural bond stresses, IS code provisions, anchorage zone stresses in post-tensioned members, stress distribution in end block.

Methods of transfer: Analysis by approximate method, Guyon and Magnel method, anchorage zone reinforcement.

TextBook:

[1].N.KrishnaRaju, Prestressed concrete, 6thed., New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2018.

ReferenceBooks:

[1] S.Ramamrutham, Prestressed concrete, 5thed., New Delhi: Dhanpat Rai publications Pvt. Ltd., 2013.

[2] T.Y.Lin, Design of prestressed concrete structures, 3rded., Mumbai: Wiley India Pvt. Ltd., 2010.

[3] G.S.Ramaswamy, Modern prestressed concrete design, New Delhi: Arnold Heinimen, 2007.

[4] N.Rajagopalan, Prestressed Concrete, 2nded., Narosa publishers, 2010.

[5] S.K.Mallicand A.P.Gupta, Prestressed concrete, 4thed., Oxford and IBH publishing Co. Pvt. Ltd., 1987.

[6] IS1343:2012, Code of Practice for Prestressed Concrete, 2nded., New Delhi: Bureau of Indian Standards, 2012.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage

Course Patents: Patents 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 Learning Outcomes (COs):

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

CO1: appraise the concept of Pre stressing in concrete

CO2: evaluate losses in pre stress and analyze the sections

CO3: design pre stressed concrete members in flexure and shear

CO4: estimate the transfer stresses in pre stressed concrete

Course Articulation Matrix (CAM): U18CE801A PRESTRESSED CONCRETE																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE801A.1	1	2	-	-	-	1	-	1	1	1	-	1	2	-	1	1
CO2	U18CE801A.2	1	2	-	-	-	1	-	1	1	1	-	1	2	-	1	1
CO3	U18CE801A.3	1	2	2	-	-	1	-	1	1	1	-	1	2	2	1	1
CO4	U18CE801A.4	1	2	-	-	-	1	-	1	1	1	-	1	2	-	1	1
U18CE801A		1	2	2	-	-	1	-	1	1	1	-	1	2	2	1	1

U18CE801B RAILWAY AND AIRPORT ENGINEERING

Class: B.Tech.VIII-Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

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

LO1: railway track alignment and its components

LO2: geometric design of railway line and stations layout

LO3: airport planning and geometric design

LO4: airport layout & maintenance, air traffic control

UNIT-I(9)

Railway Track gauge: Classification of railway lines, undertakings of ministry of railways, Gauges-types, choice of gauge, problems caused by change of gauge, importance of good alignment, requirements of an ideal alignment, traffic, reconnaissance, preliminary and final location surveys.

Components of Track: Requirements of a good track, maintenance, coning of wheels, Rails-functions, types, rail wear, failures and flaw detection, Sleepers-functions and requirements, types and density, Ballast-types, functions and requirements, formation, Creep - causes, effects, measurement and adjustments.

UNIT-II(9)

Geometric Design: Gradients, grade compensation, circular curves, super elevation, safe speed on curves, transition curves, widening of gauge on curves, vertical curves, checkrails.

Points and Crossing: Switches, tongue rails, crossing, turnouts, layout of turnout, classification of level crossing, stations and Yards-dimensions, site selection, classification and layout of stations, marshalling yard, locomotive yard, Rolling stock- types of locomotives, coaches and wagons, equipment at railway stations.

UNIT-III(9)

Airport Planning: Aeroplane component parts, field length regulations, weight components, classification of flying activity, aircraft characteristics, airport master plan, regional planning, airport site selection, surveys for site selection.

Runway and Taxiway Design: Zoning laws, classification of obstructions, approach zone and turning zone, run way orientation, basic runway length, correction for elevation, temperature and gradient, run way geometric design, factors controlling taxiway layout, geometric design standards, exit taxiways.

UNIT-IV(9)

Airport Capacity and Layout: Airport and runway capacity, runway configuration, terminal and building area, parking area, apron, hangar, typical airport layouts.

Airport Maintenance and Air Traffic Control: Need for maintenance, failures in flexible and rigid pavements, need of air traffic control, air traffic control network, Air traffic control aids – enroute aids and landing aids.

TextBooks:

- [1] Satish Chandra and M.M. Agarwal, Railway Engineering, 2nd ed., New Delhi: Oxford Publishers, 2013. (Chapters 1–4, 6–8, 11–14, 26 and 27)
- [2] S.K. Khanna, M.G. Arora and S.S. Jain, Airport Planning and Design, 6th ed., Roorkee: Nem Chand & Bros, 2014. (Chapters 3–8, 10, 11 and 13)

ReferenceBooks:

- [1] J.S. Mundrey, Railway Track Engineering, 4th ed., New Delhi: Tata McGraw Hill, 2009.
- [2] Rangwala, Railway Engineering, 25th ed., New Delhi: Charotar Publishing House Pvt. Ltd., 2015.
- [3] S.C. Saxena and S.P. Arora, A text Book of Railway Engineering, New Delhi: Dhanpat Rai and Sons, 2015.
- [4] G. Venkatappa rao, Airport Engineering, 2nd ed., New Delhi: Tata McGraw Hill, Inc., 1992.
- [5] Rangwala, Airport Engineering, 17th ed., New Delhi: Charotar Publishing House Pvt. Ltd., 2018.
- [6] Subhash. C. Saxena, Airport Engineering and Planning, 1st ed., New Delhi: CBS Publishers and Distributors Pvt. Ltd., 2014.

Course Research Papers: Research papers (Journal/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 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 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: appraise railway components and track alignment

CO2: design the elements of railway track

CO3: propose the planning process & design the runway and taxiway length

CO4: interpret the airport capacity, air field pavement failures and air traffic control

Course Articulation Matrix(CAM):U18CE801B–RAILWAY AND AIRPORT ENGINEERING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE801B.1	1	2	1	1	-	1	1	1	1	1	-	1	2	1	-	1
CO2	U18CE801B.2	1	2	1	1	-	1	1	1	1	1	-	1	2	1	-	1
CO3	U18CE801B.3	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	1
CO4	U18CE801B.4	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	1
	U18CE801B	1	2	1	1	-	1	1	1	1	1	-	1	2	1	-	1

U18CE801C CONSTRUCTION CONTRACTS MANAGEMENT

Class:B.Tech.VIII-Semester

Branch: Civil Engineering(CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: *tenders and construction contracts*

LO2: *contract documents, measurement and payments*

LO3: *contract management and their conditions*

LO4: *dispute Resolution, claims and variations*

UNIT-I(9)

Tenders: Invitation, types, modes of invitation tenders, pre-qualification of tender,(Notice Inviting Tenders (NIT), preparation and submission of tenders and irregularities, consideration and scrutiny of tender, acceptance, rejection and correspondence.

Construction contracting: The Indian contract Act 1872, Provisions of the Act, Essentials of a valid contract, contract documents, types of contracts – lumpsum, measurement, cost plus, Public Private Partnership, Build operate and transfer, Engineering procurement construction.

UNIT-II(9)

Contracts documents: Contract forms, form of agreement, bond- performance bond, labour, material payment bond, lien and maintenance; Conditions of contract - standard forms, specifications, drawings, bill of quantities; Bidding procedures-Bid documents, requirements, procedures, receiving and opening bids, bid evaluation award of contract.

Measurement and payment: FIDIC form (International federation of consulting engineers), Ministry of Statistics and Programme Implementation, Government of India (MOS & PI), running bills, final bills, advance payment, secured advance, escalation, interim payment certificate, over payments and under payments, Breach of contract.

UNIT-III(9)

Contracts Performance Management: Monitoring and controlling, Technical and operational performance of contracts, controlling risks, Incentives and penalties, Change order management.

Contract Conditions: Important contract clauses, Terms of payments, Retention, Acceptance and final payment, Time of completion, Extension of time, Maintenance period, Termination of contract and condition for termination.

UNIT-IV (9)

Claims and variations: Claims, factors affecting, Variations in work and conditions, Liquidated damages. Rights, Responsibilities and duties of client (Owner). Architect, Engineer and Contractor.

Methods of Dispute Resolution: Negotiation, litigation, alternative dispute resolution (ADR) techniques - partnering, mediation, arbitration, disputes review board (DRB), mini trials, importance of documentation.

TextBooks:

- [1]. Akhtar Surahyo, *Understanding Construction Contracts*, Springer International, 1st edition, Publishing, AG2018. (Chapters-7,8,12,15,17)
- [2]. B.S. Patil and S.P. Woolhouse B.S. Patil's *Building and Engineering Contracts*, 7th edition, CRC Press, Taylor & Francis Group, 52 Vanderbilt Avenue New York, NY10017. (Chapters-1,2,7,10,5,13,14,16)

Reference Books:

- [1]. "CPWD7/8: General Conditions of Contracts", Govt of India, Central Public works Department. (old syllabus)
- [2]. "Analysis of Rates for Delhi (Volume 1 and 2) and Delhi Schedule of Rates", Govt of India, Central Public Works Department.
- [3]. Jimmie Hinze, "Construction Contracts", McGrawHill, 2001
- [4]. V.K. Raina, "Construction and Contract Management" Shroff Publishers
- [5]. B.S Ramaswamy, "Contracts and their Management", Lexis Nexis India, 2008.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 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 students will be able to...

- CO1: summarize tenders and construction contracts
- CO2: develop the documents of construction contracts, measurement and Payments
- CO3: review on tract management and conditions
- CO4: predict claims, variations and recommend resolutions for disputes in contracts.

Course Articulation Matrix (Mapping of Cos with Pos and PSOs):

Course Articulation Matrix: U18CE801C CONSTRUCTION CONTRACTS MANAGEMENT																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE801C.1	1	-	-	-	-	1	-	1	1	1	-	1	1	-	-	1
CO2	U18CE801C.2	1	2	-	-	-	1	-	1	1	1	-	1	1	2	-	1
CO3	U18CE801C.3	1	2	-	-	-	1	-	1	1	1	-	1	1	2	-	1
CO4	U18CE801C.4	1	2	-	-	-	1	-	1	1	1	-	1	1	2	1	1
U18CE801C		1	2	-	-	-	1	-	1	1	1	-	1	1	2	1	1

U18CE802A EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Class: B.Tech.VIII-Semester

Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: Civil Engineering (CE)

Examination Scheme:

Continuous Internal Evaluation	40 marks
EndSemester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on....

LO1: engineering seismology and disaster mitigation

LO2: single and multi-degree of freedom systems

LO3: estimation of storey shear, torsional moments and seismic design of footings

LO4: retrofitting and restoration of reinforced concrete, masonry buildings

UNIT I (9)

Engineering Seismology: Geology of earth, configuration of tectonic plates in a globe, influence of Geology on earthquake, behavior of plates, their motion and effects, causes of earthquake and their characteristics, earthquake parameters, magnitudes, intensity, scales, seismic zoning of India, seismic coefficient for different zones.

Disaster Mitigation: Natural disasters, mitigation and social aspects, lessons from past earthquake, Study of damages caused due to past, earthquakes in/outside India and remedial measures.

UNIT II (9)

Single Degree of Freedom Systems: Vibrations, causes, classifications, Single Degree of Freedom systems (SDOF), free, un-damped vibrations.

Multi Degree of Freedom systems: Introduction to Multi-Degrees of Freedom systems (MDOF), derivations of related equations and solutions to two degree of freedom systems.

UNIT III (9)

Seismic design of Symmetrical RC structures: Effect of earthquake on RC structure, IS provision, seismic coefficient method, basic requirements, estimation of story shear.

Seismic design of Unsymmetrical RC structures: Effect of unsymmetrical geometry and masses, mass center and stiffness center, estimation of story shear and torsional moments for unsymmetrical buildings.

UNIT IV (9)

Seismic Base Isolation: Necessity and types of base Isolation systems, Configuration and qualitative behavior of isolated building.

Analysis of Structures with Seismic Isolation Systems: Behavior of RC structures with isolation systems, review of building code requirements.

Text Book:

[1]. S.K. Duggal, *Earthquake Resistant Design of Structures*, 2nd ed., New Delhi: Oxford University Press, 2013.

Reference Books:

- [1]. Pankaj Agarwal and Manish Shrikande, *Earthquake Resistant Design of Structures*, 2nd ed., Prentice Hall of India Publications, 2014.
- [2]. R.W. Clough and J. Penzien, *Dynamics of Structures* 3rd ed., Mc Graw Hill Civil Engineering Series, 2015.
- [3]. Anil Chopra, *Dynamics of Structures*, 3rd ed., Prentice Hall India Publications, 2015.
- [4]. Jaikrishna, Chandrasekaran and Brijesh Chandra, *Elements of Earthquake Engineering*, 1st ed., New Delhi: South Asian Publishers, 1994.
- [5]. Relevant Latest Revisions of IS codes. IS 1893, IS 4326, IS 13920, IS 13827, IS 13828, IS 13935.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

Upon completion of this course the student will be able to...

CO1: review basics of engineering seismology and disaster mitigation

CO2: analyze single and multi -degree of freedom systems

CO3: estimate storey shear and torsional moments for R.C. frames

CO4: elucidate methods of retrofitting and restoration of reinforced concrete, masonry buildings

Course Articulation Matrix:U18CE802A EARTHQUAKE RESISTANT DESIGN OF STRUCTURES																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE802A.1	2	2	1	1	-	1	1	1	1	1	-	1	2	2	1	1
CO2	U18CE802A.2	2	2	1	1	-	1	1	1	1	1	-	1	2	2	-	1
CO3	U18CE802A.3	2	2	2	1	-	1	1	1	1	1	-	1	2	2	-	1
CO4	U18CE802A.4	2	2	2	1	-	1	1	1	1	1	-	1	2	2	-	1
U18CE802A		2	2	1.50	2	-	1	1	1	1	1	-	1	2	2	1	1

U18CE802B EARTH RETAINING STRUCTURES

Class:B.Tech.VIII-Semester

Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: Civil Engineering (CE)

Examination Scheme:

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1: principles of earth and rock fill dams

LO2: stabilization of retaining walls

LO3: design of sheet pile walls and loads on conduits

LO4: components of braced cuts and cofferdams

UNIT-I(9)

Earth Dams: Types, site selection, methods of construction, densities, pore water pressure and its significance, dam failures-hydraulic, see page and structural failures, design criteria, slope stability, see page control in earth dams, design of filters, slope protection, advantages and disadvantages of earthen dams.

Rock fill dams: Site selection, types, construction methods, merits and demerits.

UNIT-II (9)

Earth retaining Walls: Types, design principles, gravity and cantilever retaining walls, constructional aspects, expansion and contraction joints.

Mechanically stabilized retaining Walls: Soil reinforcement, design considerations, design with metallic strip reinforcement, retaining wall with geo-textile reinforcement

UNIT-III (9)

Underground Conduits: Types -positive, negative projecting, ditch, imperfect ditch, tunnel conduits, load sand construction of conduits.

Sheet pile Walls: Types, Uses, Design of cantilever sheet pile walls in granular and cohesive soils, design of anchored sheet pile walls by free earth method in granular and cohesive soils.

UNIT-IV(9)

Braced cuts: Lateral earth pressure on sheeting in sand and clayey soils, Types of sheeting and bracing system, Design components of braced cuts, Safety of bottom of excavation against boiling and heave.

Coffer Dams: Types, uses, relative merits and demerits, design of circular cellular cofferdam by TVA method on rock sand on soil.

Text Books:

- [1]. M.Braja Das, *Principles of foundation engineering*, 9thed., United States: Cengage Publications, 2019. (Chapters 8,9,10)
- [2]. S.K.Garg, *Irrigation Engineering and Hydraulic Structures*, 30thed., New Delhi: Khanna Publishers, 2013. (Chapter 20)

Reference Books:

- [1]. K.R. Arora, *Soil Mechanic sand Foundation Engineering*, 9thed., New Delhi: Standard Publisher Distributors, 2013.

[2].Swami Saran, Analysis and Design of Substructures Limit State Design, 9th ed., New Delhi: Oxford and IBH Publishing Company, Pvt. Ltd., 2013.

[3]. Joesph E. Bowles, Foundation Analysis and Design, 5th ed., Singapore: McGraw-Hill education, 2001.

[4]. Peck, Hanson and Thornborn, Foundation Engineering, 2nd ed., New York: John Wiley Publications, 1974.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: design earth and rock fill dams

CO2: demonstrate stabilization of retaining walls

CO3: design sheet pile wall and conduits

CO4: illustrate the components of braced cut and coffer dams

U18CE802B- PROFESSIONAL ELECTIVE-IV: EARTH RETAINING STRUCTURES																	
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE802B.1	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
CO2	U18CE802B.2	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
CO3	U18CE802B.3	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
CO4	U18CE802B.4	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
U18CE802B		2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1

U18CE802C BRIDGE ENGINEERING

Class:B.Tech.VIII-Semester

Teaching Scheme:

Branch: Civil Engineering (CE)

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: loads and design considerations of bridges

LO2: design of deck slab and T-Beam bridges

LO3: bridge bearings and bridge appurtenances

LO4: elements of bridge sub-structure

UNIT-I(9)

Bridges and their loading: Types of bridges, materials for construction, codes of practice-railway and highway bridges, design loads and IRC standard loading.

Hydraulic Design: Planning, layout, hydraulic geometry, linear water ways, economic spans, afflux, scour, geological and geo technical considerations.

UNIT-II (9)

Deck Slab Bridge: Types, functions, design of reinforced cement concrete road bridge as per IRC loading.

T-Beam Bridge: Analysis of beams, Courbon's method, design of T-beam bridge.

UNIT-III(9)

Bearings: Types and functions, force sand materials, design of elastomeric pad bearing.

Bridge Appurtenances: Expansion joints, design of joint railings, drainage systems and lighting.

UNIT-IV(9)

Sub-Structure: Loads acting on sub structure, design of pier and pier cap, stability analysis of abutments, retaining and wing walls.

Bridge Foundations: Types, design of shallow and deep foundations.

TextBooks:

[1].T.R. Jagdish and M.A. Jayaram, *Design of Bridge Structures*, 3rd ed. NewDelhi: PHI Learning Pvt. Ltd., 2020.

Reference Books:

[1].N. Krishna Raju, *Design of Bridges*, 5thed. NewDelhi: Oxford and IBH Publishing Co.Pvt.Ltd.,2019.

[2].D. Johnson Victor, *Essentials of Bridge Engineering*, 6thed.New Delhi: IBH Publishing Co. Ltd.,2019.

[3].IRC5:2015 *Standard Specifications and Code of Practice for Road Bridges*, 8th revision, NewDelhi: The Indian Road Congress,2015.

[4]. IRC6:2017 *Standard Specifications and Code of Practice for Road Bridges*,7threvision,New Delhi: The Indian Road Congress,2014.

[5]. IRC21:2000 *Standard Specifications and Code of Practice for Road Bridges*, 3rd revision, NewDelhi: The Indian Road Congress, 2000.

[6].IRC83:2018 *Standard Specifications and Code of Practice for Road Bridges, Section IX-Bearings*

(Elastomeric Bearings), Part II, 2nd revision, NewDelhi: The Indian Road Congress,2 018.

[7].BIS,IS456:2000, *Code of practice for Plain and reinforced concrete*, 5th revision, NewDelhi: Bureau of Indian standards,2000.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage.

Course Patents: Patents 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 Learning Outcomes (COs):

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

CO1: appraise loads and design specification for bridges

CO2: design deck slab and T-Beam bridge

CO3: recommend types of bearing and appurtenances

CO4: evaluate the behavior of sub-structure elements

Course Articulation Matrix: U18CE802C BRIDGE ENGINEERING																	
CO		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	U18CE802C.1	1	1	1	1	-	1	-	1	1	1	-	1	1	1	-	1
CO2	U18CE802C.2	1	2	2	1	-	1	-	1	1	1	-	1	2	2	1	1
CO3	U18CE802C.3	1	1	2	1	-	1	-	1	1	1	-	1	1	2	1	1
CO4	U18CE802C.4	1	2	2	1	-	1	-	1	1	1	-	1	2	2	1	1
U18CE802C		1	1.50	1.75	1	-	1	-	1	1	1	-	1	2	1.75	1	1

U18OE803A-OPEARTIONSRESEARCH

Class:B.Tech.VIII-Semester

Branch(s): CE,ME, CSE, IT,EEE,ECE,EIE

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: *concepts to solve linear programming problems which arise in real life using various methods and their advantages*

LO2: *applications of linear programming namely transportation and assignment problems which arise in different engineering fields.*

LO3: *non-linearity in optimization problems, direct search techniques and iterative methods.*

LO4: *various queuing systems and their practical relevance.*

UNIT-I(9)

Linear Programming Problem (LPP): Mathematical models and basic concepts of linear programming problem; Solution of linear programming problem-Graphical method, Simplex method, Artificial variable techniques (Big - M and Two -phase method), Duality in linear programming, dual simplex method.

UNIT-II(9)

Special types of LPP: Mathematical model of transportation problem, Methods of finding initial basic feasible solution, optimal solution of transportation problem, Degeneracy in transportation problem; Exceptional cases in transportation problem-Unbalanced transportation problem, Maximization transportation problem; Assignment problem-Mathematical formulation of the problem, Hungarian method to solve an assignment problem, Special cases in assignment problem- Maximization assignment problem.

UNIT-III(9)

Non-linear Programming Problem (NLPP): Classical method of optimization using Hessian matrix; Iterative methods - Random search methods -Random jump method, Random walk method, Steepest decent method and Conjugate gradient method; Direct methods-Lagrange's method, Kuhn-Tucker conditions.

UNIT-IV(9)

Queueing Theory: Queueing system-Elements and operating characteristics of a queueing system; Probability distributions in queueing systems-Distribution of arrivals (Pure Birth Process); Classification of queueing models; Poisson queueing systems-Study of various characteristics of single server queueing model having infinite population $M/M/1$: $FCFS$ and $priority$ and single server queueing model having finite population $M/M/1$: $FCFS$, $priority$, Generalized model (Birth-Death process).

Textbook:

[1]. Kantiswarup et.al, Operations Research, 16thed., New Delhi: S. Chand & Sons, 2013. (Unit-I, Unit-II, Unit-IV)

[2]. Singiresu S. Rao, Engineering Optimization Theory and Practice, 4thed., Hoboken, New Jersey: John Wiley & Sons, Inc, 2009 (Unit-III)

Reference Books:

[1]. Hamdy.A.Taha, Operations Research, 7thed., New Delhi: Prentice Hall of India Ltd, 2002.

[2]. J.C.Pant, Introduction to Optimization, 7thed., New Delhi: Jain Brothers, 2012.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage

Course Patents: Patents 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 Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: *model engineering real time problems and solve them using various LPP techniques*

CO2: *obtain the optimal solution of transportation, assignment problem sand their real time applications*

CO3: *optimize the engineering problems using NLPP techniques*

CO4: *differentiate various queuing model sand their practical relevance*

Course Articulation Matrix: U18OE803A-OPEARTIONSRESEARCH															
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	1	-
CO2	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	1	-
CO3	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	1	-
CO4	U18OE803A	2	2	-	-	-	-	-	-	-	1	--	1	1	-
U18OE803A		2	2	-	-	-	-	-	-	-	1		1	1	1

U18OE803B MANAGEMENT INFORMATION SYSTEMS

Class:B.Tech.VIII-Semester

Teaching Scheme:

L	T	P	C
3	-	-	3

Branch: CE, CSE&IT

Examination Scheme:

Continuous Internal Evaluation	40Marks
End Semester Exam	60Marks

Course Learning Objectives(LOs):

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

LO1: basic concepts and challenges of management information systems

LO2:e-business and decision support systems techniques

LO3: development process and design of management information systems

LO4: different applications of management information systems

UNIT-I(9)

Management Information Systems: Systems: An Overview: Introduction, Need for management information systems, Management information systems: A concept, MIS: A definition, Management information system and Information technology, Nature and scope of MIS, MIS characteristics, Structure of MIS, Types of MIS, Role of MIS in global business, Challenges of managing information systems, IT Infrastructure and Emerging Technology

UNIT-II (9)

Business Applications of Information Systems:

E-Commerce, E-Business and E-Governance: Introduction, E-commerce, E-commerce sales life cycle, E-commerce infrastructure, E-commerce applications, E-commerce payment systems, Management challenges and opportunities-business, E-governance

Decision Support Systems: Introduction, Decision - Making :A concept, Simon's model of decision-making, Types of decisions, Methods for decision-making, Decision support techniques, Decision-making and role of MIS, Decision support systems, Business intelligence, Knowledge management systems

UNIT-III(9)

Development process of MIS: Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organization for development of MIS, MIS: Development process mode

Strategic Design of MIS: Strategic management of the business, Why strategic design of MIS, Balance score card, Score card and Dash board, Strategic design of MIS, Development process steps for strategic design (SD) of MIS, Illustrating SD of MIS for big bazaar, Strategic management of business and SD of MIS, Business strategy determination, Business strategy implementation

UNIT- IV(9)

Management of Global Enterprise: Enterprise management system, Enterprise resource planning (ERP) System, ERP model and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM, Customer relationship management (CRM), Management of global enterprise, EMS and MIS

Applications in Manufacturing Sector: Introduction, Personnel management (PM), Financial management (FM), Production management (PM), Raw materials management (RMM), Marketing management, Corporate overview.

TextBooks:

[1] D.P. Goyal, Vikas, *Management Information Systems- Managerial Perspective*, 4thed. Addison-Wesley, 2014. (Unit1)

[2] Waman S. Jawadekar, *Management Information Systems Text and Cases: a Global Digital Enterprise Perspective*, 5thed. Mc GrawHill, 2014 (Unit2,3,4)

ReferenceBooks:

[1] Kenneth C. Laudon & Jane P. Laudon, *Management Information Systems*, 12th ed. Prentice Hall, 2012.

[2] S.Sadagopan, *Management Information Systems*, 2nded., PHI Learning, 2014.

Course Learning Outcomes (COs):

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

CO1: explain the structure and importance of management information systems

CO2: analyze management information systems for decision making

CO3: explain the methodology to design and develop a management information system

CO4: describe different applications of management information systems in various manufacturing sectors

Course Articulation Matrix (CAM): U18OE803B MANAGEMENT INFORMATION SYSTEMS																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE803B.1	2	2	1	1	1	-	-	-	-	1	-	1	2	1	2
CO2	U18OE803B.2	2	2	2	1	1	-	-	-	-	1	-	1	2	1	2
CO3	U18OE803B.3	2	2	2	3	1	-	-	-	-	1	-	2	2	1	2
CO4	U18OE803B.4	2	2	3	3	1	-	-	-	-	1	-	2	3	1	3
U18OE803B		2	2	2	2	1	-	-	-	-	1	-	1.5	2.25	1	2.25

U18OE 803C ENTREPRENEURSHIP DEVELOPMENT

(Open Elective-IV)

Class: B.Tech.VIII Semester

Branch: CE, ME, CSE, IT, EEE, ECE, EIE

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 characteristics of entrepreneur and his role in development of the nation

LO2: creativity and business plan

LO3: functions of various managements / managers in industry

LO4: legal issues in entrepreneurship and intellectual property rights

UNIT-I(9)

Entrepreneur ship: Definition, role of entrepreneur ship in economic development, characteristics and types of an entrepreneur, Forms of business organizations; agencies dealing with entrepreneurship and small scale Industries; Case studies of successful entrepreneurs- identification of business opportunities in various branches of engineering

UNIT-II(9)

Creativity and Business Idea: Sources of new ideas, methods of generating ideas and creative problem solving, concepts of innovation and incubation.

Business Plan: definition, scope and value of business plan, market survey and demand survey.

Feasibility studies: Technical feasibility, financial viability and social acceptability; Preparation of preliminary and bankable project reports;

UNIT-III(9)

Project Planning: Product planning and development process, Sequential steps in executing the project.

Plant layout: Principles, types and factors influencing layouts,

Material Management: Purchase procedures, Issues of Materials-LIFO, FIFO, HIFO and Base stock;

Fundamentals of Production Management: Production Planning and Control (PPC)-Concepts and functions, Long & short run problems.

Marketing Management: Definition, functions and market segmentation.

UNIT-IV(9)

Financial Management: Introduction, Sources of finance – internal and external.

Human Resource Management: Introduction, importance, selection, recruitment, training, placement, development;

Legal Issues in Entrepreneurship: Mechanisms for resolving conflicts; Industrial laws-Indian Factories Act, Workmen Compensation Act; Intellectual Property Rights (IPR) – patents, trademarks, and copyrights.

TextBooks:

- 1) Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata McGraw-Hill, 9th Edition 2014 (Chapters 1, 2, 4, 5, 6, 7, 8, 11 and 13).

Reference Books

1. David H. Holt, "Entrepreneurship New venture creation" Prentice Hall of India. 2004.
2. Handbook for "New Entrepreneurs", Entrepreneurship Development Institute of India, Ahmadabad.
3. T.R. Banga, "Project Planning and Entrepreneurship Development", CBS Publishers, New Delhi, 1984.
4. Personnel efficiency in Entrepreneurship Development - "A Practical Guide to Industrial Entrepreneurs", S. Chand & Co., New Delhi.

Course Learning Outcomes (COs):

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

CO1: describe characteristics of entrepreneur and his role in economic development

CO2: apply creative problem solving methods to real time situations

CO3: explain the functions of production and marketing managements

CO4: identify the legal issues in entrepreneurship and explain intellectual property rights

Course Articulation Matrix (Mapping of COs with Pos and PSOs):

Course Articulation Matrix (CAM): U18OE803 C ENTREPRENEURSHIP DEVELOPMENT														
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
U18OE803C.1	1	1	1	-	-	-	-	1	-	1	1	1	1	1
U18OE803C.2	1	1	1	-	-	-	-	1	-	1	1	1	1	1
U18OE803C.3	1	1	1	-	-	-	-	1	-	1	1	1	1	1
U18OE803C.4	1	1	1	-	-	-	-	1	-	1	1	1	1	1
U18OE803C	1	1	1	-	-	-	-	1	-	1	1	1	1	1

U18OE803 D FOREX AND FOREIGN TRADE

Class:B.TechVIII Semester

Branch: CE, ME,CSE,IT,EEE,ECE,EIE

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40marks
End Semester Exam	60marks

Course Learning Objectives (LO):

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

LO1: business, business system, objectives and types of companies

LO2: fundamentals of foreign trade and EXIM procedure

LO3: foreign exchange rate and methods of payments

LO4: foreign exchange control

UNIT-I (9)

Business: Nature and scope, Classification of business activities, Functions of commerce and trade.

Business System: Characteristics and components of business system, objectives of business, classification of business objectives; Types of Business. .

UNIT-II(9)

Foreign Trade: Introduction of International Trade, Reasons for External Trade, Special problems of Foreign Trade; EXIM-objectives, roles of EXIM in Foreign Trade, Stages In Import procedure, Stages in export procedure-bill of lading, mate' s receipt, certificate of origin.

Corporations Assisting Foreign Trade: State Trading Corporation of India, Export Credit and Guarantee Corporation, Minerals and Metals Trading Corporation of India.

UNIT-III(9)

Foreign Exchange Rate: Meaning and importance of Foreign exchange rate, Methods of foreign payments, Exchange rates- Spot, Forward and Cross Rates; Demand and supply of foreign exchange rate, Equilibrium rate of foreign exchange, Theories of determining foreign exchange rate, International Parity condition-Balance of payments.

Foreign Exchange Markets: Functions of exchange markets, Components and Players in Exchange Markets; FEMA-objectives and its role in Foreign Trade.

UNIT-IV (9)

Foreign Exchange Control: objectives, characteristics, advantages and disadvantages, Methods: intervention, exchange restriction, multiple exchange rates, exchange clearing agreements, method of operation, exchange clearing agreements in practice, payments agreements, transfer moratoria; indirect methods.

Text Books:

1. C.B.Guptha, *Business Organization & Management*, 15thed. New:SultanChand&Sons,2015 (Units1,5)
2. M.L.Seth, *Macro Economics*, 22nded. NewDelhi;L akshmiNarayanAgarwalPublishers,2014.
3. M.C.Vaish,RatanPrakashanMandir,Monetary Theory, 16thed. New Delhi:Vikas Publications,2016

ReferenceBooks:

1. Y.K.Bhushan, "Business Organization and Modern Management" Sultan & Sons Publishers, New Delhi. 15/e, 2014.
2. S.A.Sherlekar "Business Organization and Management", Himalaya Publishing House, 2000.
3. K.P.M.Sundaram, "Money Banking, Trade & Finance", Sultan & Sons Publishers, New Delhi.
4. P.N.Chopra, "Macro Economics", Kalyani Publishers, 1/e, Ludhiana

Course Learning Outcomes (CO):

Upon completion of the course, the student will be able to...

CO1: evaluate the objectives and types of industries and companies.

CO2: assess the procedure in imports and exports

CO3: analyse the foreign exchange rate and methods of foreign payments

CO4: Adapt the methods of exchange control

Course Articulation Matrix (CAM): U18OE803D FOREX AND FOREIGN TRADE														
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
U18OE803D.1	1	1	-	-	-	-	-	-	-	2	2	1	1	1
U18OE803D.2	1	1	-	-	-	-	-	-	-	2	2	1	1	1
U18OE803D.3	1	1	-	-	-	-	-	-	-	2	2	1	1	1
U18OE803D.4	1	1	-	-	-	-	-	--	-	2	2	1	1	1
U18OE803D	1	1	-	-	-	-	-	-	-	2	2	1	1	1

U18CE804: MAJOR PROJECT WORK PHASE-II

Class: B.Tech. VIII- Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	14	7

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

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
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. 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.
6. **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-semester break and get ready with informative, confident and comfortable presentation for progress presentation-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.
 - (iii) **The project supervisors shall ensure students focus on the project objectives and expected deliverables**
 - (iv) **The project supervisors shall ensure students have sufficient resources for successful project completion.**
 - (v) **The project supervisors shall continue guiding students on**

- (a) *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.
 - (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 environmental Considerations
 - (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 leader in 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
- (vi) **The project supervisors are also expected to continuously emphasize and guide the students on**
- (a) **Following project timeline:** completing the tasks as planned in project timeline
 - (b) **Meeting Cadence:**
 - i. **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.
 - 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
 - (c) **Project Log Book:** The activity journaling in project log book is very important for a successful project.
 - i. 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.).
 - ii. 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.
 - iii. 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.
 - iv. Log books are to be shown during all presentations and will be graded along with the project.
 - v. 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.

(d) **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.

(e) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(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 the proposed work by the end of *phase-II*

(h) Right conduct of research to promote academic integrity, honesty and time management

(i) 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*).

(j) Consequences of plagiarism, and use of anti-plagiarism software to detect

(k) plagiarism in the report

(l) Submission of major project work report within acceptable plagiarism levels, as per the *Anti-plagiarism policy-2020 of our institute*

(m) **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*).

(n) **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 peer reviewed journal.

(o) **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.

(vii) **Phase – II evaluation:** There shall be only Continuous Internal Evaluation (CIE) for major project work *phase-I* 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 tasks accomplished?*

- 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**

(viii) Evaluation for Major project 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%) <i>(a) Progress presentation-II (10%)</i> <i>(b) Final presentation (10%)</i> <i>(c) Working model / process / software package / system developed (20%)</i> <i>(d) Project video pitch (5%)</i> <i>(e) Project paper (5%)</i>	60%
B. ESE <i>(i) Well-documented project report (15%)</i> <i>(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)</i> <i>(ii) Oral presentation with PPTs and viva-voce (15%)</i> <i>(iii) Project poster (5%)</i> <i>(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)</i>	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
 - a. be 3 to 5-minute-long video (no longer than 5 minutes)
 - b. be concise and to the point, on the problem, proposed solution and its salient features.
 - c. show project timeline and sample page of log book
 - d. 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.
 - 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*
- (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 prototype / 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.
- (ix) 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 their major 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 prototype / working model / software package / system developed
- (x) 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 presentation
 - (b) he/she fails to fulfill the requirements of Major project work *phase-II* evaluation as per specified guidelines
- (xii) Supplementary examination for Major project work *phase-II*
 - (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-II* supplementary exam and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

Upon completion of the major project work, students will be able to...

CO1: review research 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) :U18CE804MAJOR PROJECT WORK PHASE-II

CO	COCode	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE804.1	2	2	2	2	-	-	-	3	-	2	-	3	2	2	-	-
CO2	U18CE804.2	1	2	2	-	2	2	2	3	-	-	-	3	2	2	-	-
CO3	U18CE804.3	-	-	-	-	-	-	-	3	2	-	2	3	-	-	2	2
CO4	U18CE804.4	-	-	2	2	-	-	-	3	-	2	-	3	-	-	2	2
U18CE804		1.5	2	2	2	2	2	2	3	2	2	2	3	2	2	2	2