M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
Approved by AICTE & Affiliated to Anna University
ISO 9001:2015 Certified Institution
Thalavapalayam, Karur, Tamilnadu.

REGULATION 2018

DEPARTMENT OF CIVIL ENGINEERING

CURRICULUM AND SYLLABUS

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DEPARTMENT OF CIVIL ENGINEERING

CURRICULUM

CURRICULUM AND SYLLABUS

REGULATION 2018

Programme: B.E. – CIVIL ENGINEERING

Vision of the Department:

- To continue to excel national and international recognition through the impact of civil engineering knowledge of our students and alumni to build better human society.

Mission of the Department:

M1: To produce smart civil engineers with basic knowledge on science and engineering to compete the global challenges.

M2: To make the department to excel in the thrust areas of structural engineering and environmental engineering research.

M3: To work with the society to identify the problems faced and providing solutions through consultancy services.

M4: To create, disseminate and integrate knowledge of engineering in the minds of fresh graduates to face the future technological challenges.

Programme Educational Objectives (PEOs):

PEO1: Graduates of the programme will contribute competent, inspired, and highly dedicated professionals in their working environment.

PEO2: Graduates of the programme will contribute versatile and innovative in the workplace, possess the capacity to face the tough challenges and converting them into opportunities, and embrace leadership and teamwork opportunities and affording sustainable engineering careers.

PEO3: Graduates of the programme will contribute Continue their professional development by obtaining advanced degrees in Core area of specialization such as Environmental Engineering, Structural engineering or professional fields like transportation and geotechnical engineering, as well as other fields of Project management, Environmental law.

PEO4: Graduates of the programme will espousal ethical attitude and evince effective skills in team management, coordination of sub workers and good leadership qualities expected of practicing engineering professionals.

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Mapping of Programme Educational Objectives with Mission of the Department:

PEOs / Department Mission Statements	M1	M2	M3	M4
PEO1	1	2	3	1
PEO2	1	1	2	3
PEO3	2	3	1	1
PEO4	2	1	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

Programme Outcomes (POs):

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs):

PSO1: Employability Skills: Able to give sustainable solution to the real time problems of society by using technical and software skills.

PSO2: Career Growth: Able to exhibit ethically their managerial and professional skills as an individual or as a team in multidisciplinary environment.

Mapping of Programme Educational Objectives with Programme Outcomes and Programme Specific Outcomes:

PEOs / POs & PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEO1	1	1	1	1	1	2	2	1	1	1	1	1	1	2
PEO2	2	3	1	2	1	1	3	1	3	1	1	2	3	1
PEO3	3	2	3	3	2	1	2	1	1	2	3	3	1	1
PEO4	2	1	1	1	1	2	1	3	2	2	2	1	1	3

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Structure of Curriculum

S.No.	Category	Credits
1	Humanities and Social Sciences including Management courses (HSMC)	12
2	Basic Science Courses(BSC)	26
3	Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/computer etc.(ESC)	20
4	Professional Core Courses(PCC)	60
5	Professional Elective Courses relevant to chosen specialization/branch (PEC)	18
6	Open Electives –Electives from other technical and /or emerging subjects (OEC)	09
7	Project Work, Minor Project, Seminar and Internship in Industry or elsewhere (PROJ)	16
8	Mandatory Courses (MC) [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	04
	Total Credits	**165**

1. Humanities and Social Sciences including Management courses (HSMC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

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DATE 16 | 10 | 2020

Department of civil Engineering
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Minutes of meeting.

* 18CEC401T - Estimation and Quantity Surveying Course proposed with Lab component and approved by panel members. Course code and credit was modified as 18CEC401J - Estimation and Quantity Surveying Estimation (Credit 4). Therefore in credit distribution added with 1 credit in professional core courses (Total No of Credit 165)

* 18CEC402T - Construction Engineering and management & Professional Elective 5 Courses are interchanged between Semesters VII & VIII based on panel members advice

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Structure of Curriculum

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4	Professional Core Courses(PCC)	59
5	Professional Elective Courses relevant to chosen specialization/branch (PEC)	18
6	Open Electives –Electives from other technical and /or emerging subjects (OEC)	09
7	Project Work, Minor Project, Seminar and Internship in Industry or elsewhere (PROJ)	16
8	Mandatory Courses (MC) [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	04
	Total Credits	**164**

1. Humanities and Social Sciences including Management courses (HSMC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

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2. Basic Science Courses (BSC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18PYB101J	Physics	3	1	2	5
18CYB101J	Chemistry	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18MAB201T	Transforms and Partial Differential Equations	3	1	0	4
18MAB204T	Statistics and Numerical Methods	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/computer etc. (ESC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics	1	0	4	3
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18EES101J(R)	Basic Electrical and Electronics Engineering	3	0	2	4
18CSS101J(R)	Programming for Problem Solving	1	0	4	3
18CES201T	Engineering Mechanics	3	1	0	4
18CES202L	Computer Aided Civil Engineering Drawing	0	0	4	2
				Total Credits	20

L-Lecture T-Tutorial P-Practical

4. Professional Core Courses (PCC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEC201J	Fluid Mechanics and Hydraulic Machinery	3	0	2	4
18CEC202T	Construction Materials and Techniques	3	0	0	3
18CEC203J	Surveying	3	0	2	4
18CEC204J	Environmental Engineering I	3	0	2	4
18CEC205J	Strength of Materials	3	0	2	4
18CEC206T	Concrete Technology	3	0	0	3
18CEC207J	Soil Mechanics	3	0	2	4
18CEC208T	Environmental Engineering II	3	0	0	3
18CEC301T	Analysis of Structures	3	1	0	4
18CEC302T	Design of Steel Structures	3	0	0	3
18CEC303T	Highway and Railway Engineering	3	0	0	3

EEE Board

DATE 15/10/2020

BoS-9

SEU – unit 1 title may be Solar radiation and measurements

PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IoT – No Change

FSM – Interchange the unit 3 & unit 4

Robotics – No change.

ESD & FC – No change.

EV – Course name may be changed as fundamentals of electric vehicles

IoT and ESD & FC subjects can be included in professional electives for EEE Students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders

One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course content also discussed and verified.

PG 2019 regulation.

Power System Protection Course may be added as elective course in third Semester

electronics

Analog and digital electronics subject codes are revised

15/10/2020

2. Basic Science Courses (BSC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18PYB101J	Physics	3	1	2	5
18CYB101J	Chemistry	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18MAB201T	Transforms and Partial Differential Equations	3	1	0	4
18MAB204T	Statistics and Numerical Methods	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/computer etc. (ESC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics	1	0	4	3
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18EES101J	Basic Electrical and Electronics Engineering	3	0	2	4
18CSS101J(R)	Programming for Problem Solving	1	0	4	3
18CES201T	Engineering Mechanics	3	1	0	4
18CES202L	Computer Aided Civil Engineering Drawing	0	0	4	2
				Total Credits	20

L-Lecture T-Tutorial P-Practical

4. Professional Core Courses (PCC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEC201J	Fluid Mechanics and Hydraulic Machinery	3	0	2	4
18CEC202T	Construction Materials and Techniques	3	0	0	3
18CEC203J	Surveying	3	0	2	4
18CEC204J	Environmental Engineering I	3	0	2	4
18CEC205J	Strength of Materials	3	0	2	4
18CEC206T	Concrete Technology	3	0	0	3
18CEC207J	Soil Mechanics	3	0	2	4
18CEC208T	Environmental Engineering II	3	0	0	3
18CEC301T	Analysis of Structures	3	1	0	4
18CEC302T	Design of Steel Structures	3	0	0	3
18CEC303T	Highway and Railway Engineering	3	0	0	3

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IT Board.

8.10 Syllabus Revision for 18CSS101J Programming for Problem Solving

- Faculties and Students felt that current syllabus is too heavy. Suggested for reframing the syllabus and accepted for reframing as 2 0 2[Total Credits:3].
- Basics need to be concentrated much through practicals.

MEMBERS PRESENT

1. Dr.A.Kannan - A. Kannan
2. Dr.G.Mohana Prabha - 25/3/19
3. Dr.R.Suganya - 20/3/19
4. Dr.T.Abirami - 25/3/19
5. Ms.Nivetha Ravichandran - R. Nivetha
6. Mr.S.N.Gowtham -
7. Dr.V.Durgadevi - 25/3/19
8. Mr.A.Shanmugavelaytham - A. 25/3/19
9. Mrs.R.Sujatha - R. 25/3/19.
10. Mr.M.Gunasekar - 25/3/19
11. Mr.E.Balraj - 20/3
12. Mr.S.Vinoth (15BIT2058) - 25/3/19
13. Mr.R.Balaji (16BIT3013) - R. 25/3/19

14. Ms. B. Sinthiya (ARD Coordinator) - 25/3/19

18CEC304T	Irrigation and Water Resource Engineering	3	0	0	3
18CEC305L	Concrete and Highway Engineering Laboratory	0	0	4	2
18CEC306T	Foundation Engineering	3	0	0	3
18CEC307T	Design of Reinforced Concrete Structures	3	0	0	3
18CEC308L	Survey Camp	0	0	4*	2
18CEC309L	Computer Aided Design and Drafting Laboratory	0	0	2	1
18CEC401J	Estimation and Quantity Surveying	3	0	2	4
18CEC402T	Construction Engineering and Management	3	0	0	3
				Total Credits	60

L-Lecture T-Tutorial P-Practical * Can be conducted as non-contact hours

5. Professional Elective Courses relevant to chosen specialization/branch (PEC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEE001T	Airport and Harbour Engineering	3	0	0	3
18CEE002T	Traffic Engineering and Management	3	0	0	3
18CEE003T	Urban Planning and Transportation	3	0	0	3
18CEE004T	Remote Sensing and GIS Application for Civil Engineering	3	0	0	3
18CEE005T	Sustainable Construction Methods	3	0	0	3
18CEE006T	Construction Equipment and Automation	3	0	0	3
18CEE007T	Quality Control and Assurance in Construction	3	0	0	3
18CEE008T	Project Safety Management	3	0	0	3
18CEE009T	Hydrology	3	0	0	3
18CEE010T	Ground Improvement Techniques	3	0	0	3
18CEE011T	Integrated Water Resource Management	3	0	0	3
18CEE012T	Solid and Hazardous Waste Management	3	0	0	3
18CEE013T	Air and Noise Pollution and Control	3	0	0	3
18CEE014T	Industrial Waste Management	3	0	0	3
18CEE015T	Repair and Rehabilitation of Concrete Structures	3	0	0	3
18CEE016T	Prefabricated Structures	3	0	0	3
18CEE017T	Advanced Design of Concrete Structures	3	0	0	3
18CEE018T	Advanced Design of Steel Structures	3	0	0	3
18CEE019T	Basics of Dynamics and Aseismic Design	3	0	0	3
18CEE020T	Prestressed Concrete Structures	3	0	0	3
18CEE021T	Bridge Structures	3	0	0	3
18CEE022T	Metro System and Civil Engineering Application	3	0	0	3
18CEE023T	Disaster Mitigation and Management	3	0	0	3

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* 18CEC307J - Design of Reinforced Concrete Structures course is splitted as Theory and Laboratory Separately. So course code was Changed as 18CEC307T - Design of Reinforced Concrete Structures and New Laboratory Course introduced with Concrete & Steel Related experiments and Named as 18CEC309L - Computer Aided Design and Drafting Laboratory.

* 18CEC401T - Estimation and Quantity Surveying Course proposed with Lab Component and approved by Panel members. Course code and credit was modified as 18CEC401J - Estimation and Quantity Surveying Estimation (Credit 4). Therefore in credit distribution added with 1 credit in professional core courses (Total No of credit 165)

* 18CEC402T - Construction Engineering and management & Professional Elective 5 Courses are interchanged between Semesters VII & VIII based on Panel members advice

8. Panel members Suggested offering Some Important Open elective Courses to our department student also became of the course nature and Import-ance. So following Changes was made

* 18CEE004T - GIS Applications for Civil Engineering Course was modified with Suitable Contest and renames as 18CEE004T - Remote Sensing and GIS Application for Civil Engineering

* 18CEE022T / 18CE0005T - metro System and Engineering was modified as 18CEE022T - metro System and civil Engineering Application. In open elective Course category removed the professional elective code for 18CE0005T - metro System and Engineering and finalized.

In professional Elective category two new Course Introduced with Content modification

1. 18CEE023T - Disaster mitigation & management
2. 18CEE024T - Environmental Impact and Risk Assessment.

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18CEC304T	Irrigation and Water Resource Engineering	3	0	0	3
18CEC305L	Concrete and Highway Engineering Laboratory	0	0	4	2
18CEC306T	Foundation Engineering	3	0	0	3
18CEC307J	Design of Reinforced Concrete Structures	3	0	2	4
18CEC308L	Survey Camp	0	0	4*	2
18CEC401T	Estimation and Quantity Surveying	3	0	0	3
18CEC402T	Construction Engineering and Management	3	0	0	3
				Total Credits	59

L-Lecture T-Tutorial P-Practical * Can be conducted as non-contact hours

5. Professional Elective Courses relevant to chosen specialization/branch (PEC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEE001T	Airport and Harbour Engineering	3	0	0	3
18CEE002T	Traffic Engineering and Management	3	0	0	3
18CEE003T	Urban Planning and Transportation	3	0	0	3
18CEE004T	GIS applications for Civil Engineering	3	0	0	3
18CEE005T	Sustainable Construction Methods	3	0	0	3
18CEE006T	Construction Equipment and Automation	3	0	0	3
18CEE007T	Quality Control and Assurance in Construction	3	0	0	3
18CEE008T	Project Safety Management	3	0	0	3
18CEE009T	Hydrology	3	0	0	3
18CEE010T	Ground Improvement Techniques	3	0	0	3
18CEE011T	Integrated Water Resource Management	3	0	0	3
18CEE012T	Solid and Hazardous Wastes Management	3	0	0	3
18CEE013T	Air and Noise Pollution and Control	3	0	0	3
18CEE014T	Industrial Wastes Management	3	0	0	3
18CEE015T	Repair and Rehabilitation of Concrete Structures	3	0	0	3
18CEE016T	Prefabricated Structures	3	0	0	3
18CEE017T	Advanced Design of Concrete Structures	3	0	0	3
18CEE018T	Advanced Design of Steel Structures	3	0	0	3
18CEE019T	Basics of Dynamics and Aseismic Design	3	0	0	3
18CEE020T	Prestressed Concrete Structures	3	0	0	3
18CEE021T	Bridge Structures	3	0	0	3
18CEE022T/ 18CEO005T	Metro System and Engineering	3	0	0	3
				Total Credits	18*

L-Lecture T-Tutorial P-Practical * Based on professional elective choice

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18CEE024T	Environmental Impact and Risk Assessment	3	0	0	3
				Total Credits	18*

L-Lecture T-Tutorial P-Practical * Based on professional elective choice

6. Open Elective Courses (OEC)–Electives from other technical and /or emerging subjects

Offered by Computer Science and Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CSO001T	Basics of Data Structures and Algorithms	3	0	0	3
18CSO002J	Fundamentals of Python Programming	2	0	2	3
18CSO003J	Fundamentals of Java Programming	2	0	2	3
18CSO004J	Mobile Application Development	2	0	2	3
18CSO005T	Software Development using Agile	3	0	0	3

Offered by Electronics and Communication Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ECO001T	Microcontroller and Embedded systems	3	0	0	3
18ECO002T	Internet of Everything	3	0	0	3
18ECO003T	Wireless Mobile Communication	3	0	0	3
18ECO004T	Medical Engineering	3	0	0	3
18ECO005T	Signal and Image Processing	3	0	0	3

Offered by Electrical and Electronics Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18EEO001T	Internet of Things	3	0	0	3
18EEO002T	Fundamentals of Smart Grid	3	0	0	3
18EEO003T	Robotics	3	0	0	3
18EEO004T	Energy Storing Devices and Fuel Cells	3	0	0	3
18EEO005T	Electric Vehicles	3	0	0	3

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* In Professional Elective category two new Course Introduced with content modification

1. 18BCEE023T - Disaster mitigation & management
2. 18CEE024T - Environmental Impac and Risk Assessment.

6. Open Elective Courses (OEC)–Electives from other technical and /or emerging subjects

Offered by Computer Science and Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CSO001T	Basics of Data Structures and Algorithms	3	0	0	3
18CSO002J	Fundamentals of Python Programming	2	0	2	3
18CSO003J	Fundamentals of Java Programming	2	0	2	3
18CSO004J	Mobile Application Development	2	0	2	3
18CSO005T	Software Development using Agile	3	0	0	3

Offered by Electronics and Communication Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ECO001T	Microcontroller and Embedded systems	3	0	0	3
18ECO002T	Internet of Everything	3	0	0	3
18ECO003T	Wireless Mobile Communication	3	0	0	3
18ECO004T	Medical Engineering	3	0	0	3
18ECO005T	Signal and Image Processing	3	0	0	3

Offered by Electrical and Electronics Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18EEO001T	Internet of Things	3	0	0	3
18EEO002T	Fundamentals of Smart Grid	3	0	0	3
18EEO003T	Robotics	3	0	0	3
18EEO004T	Energy Storing Devices and Fuel Cells	3	0	0	3
18EEO005T	Electric Vehicles	3	0	0	3

Offered by Electronics and Instrumentation Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18EIO001T	Basics of Automation	3	0	0	3
18EIO002T	Automotive Electronics	3	0	0	3
18EIO003T	Programmable Logic Controllers	3	0	0	3
18EIO004T	Introduction to MEMS	3	0	0	3
18EIO005T	Smart Sensor Technology	3	0	0	3

Offered by Information Technology Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITO001J	Problem Solving Techniques Using Python	1	0	4	3
18ITO002J	Java Programming	1	0	4	3
18ITO003J	Game Design and Development	1	0	4	3
18ITO004J	Web Design	2	0	2	3
18ITO005J	Data Structures	2	0	2	3

Offered by Mechanical Engineering Department

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MEO001T	Industrial Safety for Engineers	3	0	0	3
18MEO002T	Energy Engineering	3	0	0	3
18MEO003T	Automobile Technology	3	0	0	3
18MEO004T	Advances in Nanotechnology	3	0	0	3
18MEO005T	Product Design and Development	3	0	0	3

Offered by Masters in Business Administration

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MBO001T	Business Ethics and Corporate Social Responsibility	3	0	0	3
18MBO002T	Human Capital Management	3	0	0	3
18MBO003T	Digital and Social Media Marketing	3	0	0	3
18MBO004T	Banking Principles and Practices	3	0	0	3
18MBO005T	Export Management and Documentation	3	0	0	3

Open Elective Courses (OEC) offered to other departments by Civil Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEO001T	Building Services	3	0	0	3
18CEO002T	Disaster Preparedness, Planning and Management	3	0	0	3
18CEO003T	Environmental Impact Assessment	3	0	0	3
18CEO004T	Remote Sensing and GIS	3	0	0	3
18CEO005T	Metro System and Engineering	3	0	0	3

L-Lecture T-Tutorial P-Practical

7. Project Work, Minor Project, and Internship in Industry or elsewhere (PROJ)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEP101N	MOOC I / Industrial Training I	0	0	2*	1
18CEP102N	MOOC II / Industrial Training II	0	0	2*	1
18CEP103L	Minor Project I	0	0	2	1
18CEP104L	Minor Project II	0	0	2	1
18CEP105L	Minor Project III	0	0	2	1
18CEP106L	Minor Project IV	0	0	2	1
18CEP107L	Design Project	0	0	4	2
18CEP108L	Main Project	0	0	16	8
				Total Credits	16

L-Lecture T-Tutorial P-Practical

* Can be conducted as non-contact hours

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Board of Civil Engg. Approved On 16 OCT 2020 KARUR - 639 113

DATE 16 | 10 | 2020

Department of civil Engineering
9th Board of studies Meeting
Minutes of meeting.

8. panel members Suggested offering Some Important open elective Courses to our department student also became of the course nature and Import-ance. So following Changes was made

* 18CEE004T - GIS Applications for Civil Engineering Course was modified with Suitable Contest and renames as 18CEE004T - Remote Sensing and GIS Application for civil Engineering

* 18CEE022T / 18CE0005T - metro System and Engineering was modified as 18CEE022T - metro System and civil Engineering Application. In open elective Course category removed the professional elective code for 18CE0005T - metro System and Engineering and finalized.

* In Professional Elective category two new Course Introduced with content modification

1. 18BCEE023T - Disaster mitigation & management
2. 18CEE024T - Environmental Impac and Risk Assessment.

Offered by Masters in Business Administration

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MBO001T	Business Ethics and Corporate Social Responsibility	3	0	0	3
18MBO002T	Human Capital Management	3	0	0	3
18MBO003T	Digital and Social Media Marketing	3	0	0	3
18MBO004T	Banking Principles and Practices	3	0	0	3
18MBO005T	Export Management and Documentation	3	0	0	3

Open Elective Courses (OEC) offered to other departments by Civil Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEO001T	Building Services	3	0	0	3
18CEO002T	Disaster Preparedness, Planning and Management	3	0	0	3
18CEO003T	Environmental Impact Assessment	3	0	0	3
18CEO004T	Remote Sensing and GIS	3	0	0	3
18CEE021T/ 18CEO005T	Metro System and Engineering	3	0	0	3

L-Lecture T-Tutorial P-Practical

7. Project Work, Minor Project, Seminar and Internship in Industry or elsewhere (PROJ)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEP101N	MOOC I / Industrial Training I	0	0	2*	1
18CEP102N	MOOC II / Industrial Training II	0	0	2*	1
18CEP103L	Minor Project I	0	0	2	1
18CEP104L	Minor Project II	0	0	2	1
18CEP105L	Minor Project III	0	0	2	1
18CEP106L	Minor Project IV	0	0	2	1
18CEP107L	Design Project	0	0	4	2
18CEP108L	Main Project	0	0	16	8
				Total Credits	16

L-Lecture T-Tutorial P-Practical

* Can be conducted as non-contact hours

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8. Mandatory Courses (MC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEM101T	Constitution of India	1	0	0	Nil
18LEM102T	Value Education	1	0	0	Nil
18GNM101L	Physical and Mental Health using Yoga	0	0	2	Nil
18GNM102L	NSS	0	0	2	Nil
18MBM201L	Competencies in Social Skills	0	0	2	1
18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
18CYM201T	Environmental Science	1	0	0	Nil
18LEM103T	Indian Tradition and Heritage	1	0	0	Nil
18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
18MBH302L	Employability Skills and Practices	0	0	2	1
18LEM301T	Indian Art Forms	1	0	0	Nil
18LEM302T	Self Development and Entrepreneurship	1	0	0	Nil
				Total Credits	4

L-Lecture T-Tutorial P-Practical

9. One Credit Courses (OCC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEX001J	Building Planning and Vaasthu	0	1	1	1
18CEX002L	Tekla Structures	0	0	2	1
18CEX003L	Advanced Surveying using Total Station	0	0	2	1
18CEX004L	Structural Analysis and Design using STAAD PRO	0	0	2	1
18CEX005L	Building Analysis and Design using ETABS	0	0	2	1
18CEX006L	Building Information Modelling using Revit Architecture	0	0	2	1
18CEX007L	Project Management using MS Project	0	0	2	1
18CEX008L	Project Management using Primavera	0	0	2	1
18CEX009L	SketchUp	0	0	2	1

M.KUMARASAMY COLLEGE OF ENGG. AUTONOMOUS
Board of Civil Engg.
Approved On
16 OCT 2020
KARUR - 639 113

Minutes - Board of Studies – Department of Science & Humanities

Board	: Science & Humanities
Date	: 02.11.2020
Time	: 01.30 pm
Venue	: Online Mode – Google Meet
Link	: meet.google.com/noj-ybps-kjf

The Following points were discussed in the virtual meeting

English

Learning an Indian Art Forms

- Course Title "Learning an Indian Art Forms" can be changed as Indian Art Forms
- Approval can be given for the drafted syllabi - Professional English, Professional Skills and Practices, Value Education, Constitution of India, General Aptitude, and Technical English

M. KUMARASAMY COLLEGE OF ENGG.(AUTONO.) Approved by Board of Science & Humanities 02 NOV 2020 KARUR - 639 113

DATE 16/10/2020

Department of civil Engineering
9th Board of Studies Meeting
Minutes of meeting.

9. one new one Credit course named 18CEX009L-Sketch up was proposed and approved to add in existing list.

M. KUMARASAMY COLLEGE OF ENGG.(AUTONO.) Board of Civil Engg. Approved On 16 OCT 2020 KARUR - 639 113

8. Mandatory Courses (MC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEM101T	Constitution of India	1	0	0	Nil
18LEM102T	Value Education	1	0	0	Nil
18GNM101L	Physical and Mental Health using Yoga	0	0	2	Nil
18GNM102L	NSS	0	0	2	Nil
18MBM201L	Competencies in Social Skills	0	0	2	1
18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
18CYM201T	Environmental Science	1	0	0	Nil
18LEM103T	Indian Tradition and Heritage	1	0	0	Nil
18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
18MBH302L	Employability Skills and Practices	0	0	2	1
18LEM301T	Learning an Indian Art Form	1	0	0	Nil
18LEM302T	Self Development and Entrepreneurship	1	0	0	Nil
				Total Credits	4

L-Lecture T-Tutorial P-Practical

9. One Credit Courses (OCC)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEX001J	Building Planning and Vaasthu	0	1	1	1
18CEX002L	Tekla Structures	0	0	2	1
18CEX003L	Advanced Surveying using Total Station	0	0	2	1
18CEX004L	Structural Analysis and Design using STAAD PRO	0	0	2	1
18CEX005L	Building Analysis and Design using ETABS	0	0	2	1
18CEX006L	Building Information Modelling using Revit Architecture	0	0	2	1
18CEX007L	Project Management using MS Project	0	0	2	1
18CEX008L	Project Management using Primavera	0	0	2	1

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Curriculum: I to VIII Semester

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J / 18CSS101J(R)	Engineering Graphics / Programming for Problem Solving	1	0	4	3
			2	0	2	
S	18MES102J / 18EES101J / 18EES101J(R)	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J / 18CSS101J(R)	Engineering Graphics / Programming for Problem Solving	1	0	4	3
			2	0	2	
S	18MES102J / 18EES101J / 18EES101J(R)	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

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DATE 15/10/2020 BOS-9

SEU – unit 1 title may be solar gradiation and measurements
PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IoT – No change
FSM – Interchange the unit 3 & unit 4
Robotics – No change.
ESD & FC – No change.
EV – Course name may be changed as fundamentals of electric vehicles
IoT and ESD & FC subjects can be included in professional electives for EEE students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders
One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course content also discussed and verified.

PG 2019 Regulation.

Power System Protection Course may be added as elective course in third Semester
electronics
Analog and digital electronics Subject Codes are revised

15/10/2020

I to VIII Semester Curriculum

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J / 18CSS101J (R)	Engineering Graphics / Programming for Problem Solving	1	0	4	3
			2	0	2	
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J / 18CSS101J (R)	Engineering Graphics / Programming for Problem Solving	1	0	4	3
			2	0	2	
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

M. KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Science & Humanities 29 MAR 2019 KARUR - 639 113

8.10 Syllabus Revision for 18CSS101J Programming for Problem Solving

- Faculties and Students felt that current syllabus is too heavy. Suggested for reframing the syllabus and accepted for reframing as 2 0 2[Total Credits:3].
- Basics need to be concentrated much through practicals.

MEMBERS PRESENT

1. Dr.A.Kannan - A. Kannan
2. Dr.G.Mohana Prabha - 25/3/19
3. Dr.R.Suganya - 25/3/19
4. Dr.T.Abirami - 25/3/19
5. Ms.Nivetha Ravichandran - R. Nivetha
6. Mr.S.N.Gowtham -
7. Dr.V.Durgadevi - 25/3/19
8. Mr.A.Shanmugavelaytham - A. 25/3/19
9. Mrs.R.Sujatha - R. 25/3/19.
10. Mr.M.Gunasekar - 25/3/19
11. Mr.E.Balraj - 20
12. Mr.S.Vinoth (15BIT2058) - 25/3/19
13. Mr.R.Balaji (16BIT3013) - R. Balaji 25/3/19
14. Ms. B. Sinthiya (PBO Coordinator) - B. 25/3/19

I to VIII Semester Curriculum

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J	Engineering Graphics / Programming for Problem Solving	1	0	4	3
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J	Engineering Graphics / Programming for Problem Solving	1	0	4	3
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

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Semester III						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
BSC	18MAB201T	Transforms and Partial Differential Equations	3	1	0	4
ESC	18CES201T	Engineering Mechanics	3	1	0	4
PCC	18CEC201J	Fluid Mechanics and Hydraulic Machinery	3	0	2	4
PCC	18CEC202T	Construction Materials and Techniques	3	0	0	3
PCC	18CEC203J	Surveying	3	0	2	4
PCC	18CEC204J	Environmental Engineering I	3	0	2	4
PROJ	18CEP103L	Minor Project I	0	0	2	1
MC	18MBM201L	Competencies in Social Skills	0	0	2	1
MC	18CYM201T / 18LEM103T	Environmental Science / Indian Tradition and Heritage	1	0	0	Nil
					Total Credits	25

Semester IV						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
BSC	18MAB204T	Statistics and Numerical Methods	3	1	0	4
ESC	18CES202L	Computer Aided Civil Engineering Drawing	0	0	4	2
PCC	18CEC205J	Strength of Materials	3	0	2	4
PCC	18CEC206T	Concrete Technology	3	0	0	3
PCC	18CEC207J	Soil Mechanics	3	0	2	4
PCC	18CEC208T	Environmental Engineering II	3	0	0	3
PROJ	18CEP104L	Minor Project II	0	0	2	1
MC	18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
MC	18CYM201T / 18LEM103T	Environmental Science / Indian Tradition and Heritage	1	0	0	Nil
					Total Credits	22

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Semester V						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC301T	Analysis of Structures	3	1	0	4
PCC	18CEC302T	Design of Steel Structures	3	0	0	3
PCC	18CEC303T	Highway and Railway Engineering	3	0	0	3
PCC	18CEC304T	Irrigation and Water Resource Engineering	3	0	0	3
PEC	18CEE____	Professional Elective 1				3
OEC	18_____	Open Elective 1				3
PCC	18CEC305L	Concrete and Highway Engineering Laboratory	0	0	4	2
PROJ	18CEP105L	Minor Project III	0	0	2	1
PROJ	18CEP101N	MOOC I / Industrial Training I	0	0	2*	1
MC	18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
MC	18LEM301T / 18LEM302T	Indian Art Forms / Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	24

* Can be conducted as non-contact hours

Semester VI						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
HSMC	18MBH201T	Management Principles for Engineers	2	0	0	2
PCC	18CEC306T	Foundation Engineering	3	0	0	3
PCC	18CEC307T	Design of Reinforced Concrete Structures	3	0	0	3
PEC	18CEE____	Professional Elective 2				3
PEC	18CEE____	Professional Elective 3				3
OEC	18_____	Open Elective 2				3
PCC	18CEC308L	Survey Camp	0	0	4*	2
PCC	18CEC309L	Computer Aided Design and Drafting Laboratory	0	0	2	1
PROJ	18CEP106L	Minor Project IV	0	0	2	1
PROJ	18CEP102N	MOOC II / Industrial Training II	0	0	2*	1
MC	18MBM302L	Employability Skills and Practices	0	0	2	1
MC	18LEM301T / 18LEM302T	Indian Art Forms / Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	23

* Can be conducted as non-contact hours

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Board of Civil Engg.
Approved On
16 OCT 2020
KARUR - 639 113

Minutes - Board of Studies – Department of Science & Humanities

Board : Science & Humanities

Date : 02.11.2020

Time : 01.30 pm

Venue : Online Mode – Google Meet

Link : meet.google.com/noj-ybps-kjf

The Following points were discussed in the virtual meeting

English

Learning an Indian Art Forms

- Course Title "Learning an Indian Art Forms" can be changed as Indian Art Forms
- Approval can be given for the drafted syllabi - Professional English, Professional Skills and Practices, Value Education, Constitution of India, General Aptitude, and Technical English

DATE 16/10/2020

Department of Civil Engineering
9th Board of Studies Meeting
Minutes of meeting.

* 18CEC307J - Design of Reinforced Concrete Structures course is splitted as Theory and Laboratory Separately. So Course code was Changed as 18CEC307T - Design of Reinforced Concrete Structures and New Laboratory Course introduced with Concrete & Steel Related experiments and named as 18CEC309L - Computer Aided Design and Drafting Laboratory.

Semester V						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC301T	Analysis of Structures	3	1	0	4
PCC	18CEC302T	Design of Steel Structures	3	0	0	3
PCC	18CEC303T	Highway and Railway Engineering	3	0	0	3
PCC	18CEC304T	Irrigation and Water Resource Engineering	3	0	0	3
PEC	18CEE____	Professional Elective 1				3
OEC	18_____	Open Elective 1				3
PCC	18CEC305L	Concrete and Highway Engineering Laboratory	0	0	4	2
PROJ	18CEP105L	Minor Project III	0	0	2	1
PROJ	18CEP101N	MOOC I / Industrial Training I	0	0	2*	1
MC	18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
MC	18LEM301T / 18LEM302T	Learning an Indian Art Form / Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	24

* Can be conducted as non-contact hours

Semester VI						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
HSMC	18MBH201T	Management Principles for Engineers	2	0	0	2
PCC	18CEC306T	Foundation Engineering	3	0	0	3
PCC	18CEC307J	Design of Reinforced Concrete Structures	3	0	2	4
PEC	18CEE____	Professional Elective 2				3
PEC	18CEE____	Professional Elective 3				3
OEC	18_____	Open Elective 2				3
PCC	18CEC308L	Survey Camp	0	0	4*	2
PROJ	18CEP106L	Minor Project IV	0	0	2	1
PROJ	18CEP102N	MOOC II / Industrial Training II	0	0	2*	1
MC	18MBM302L	Employability Skills and Practices	0	0	2	1
MC	18LEM301T / 18LEM302T	Learning an Indian Art Form / Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	23

* Can be conducted as non-contact hours

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Semester VII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
HSMC	18MBH202T	Social Engineering	2	0	0	2
PCC	18CEC401J	Estimation and Quantity Surveying	3	0	2	4
PCC	18CEC402T	Construction Engineering and Management	3	0	0	3
PEC	18CEE____	Professional Elective 4				3
OEC	18_____	Open Elective 3				3
PROJ	18CEP107L	Design Project	0	0	4	2
					Total Credits	17

Semester VIII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE____	Professional Elective 5				3
PEC	18CEE____	Professional Elective 6				3
PROJ	18CEP108L	Main Project	0	0	16	8
					Total Credits	14

L-Lecture T-Tutorial P-Practical

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Total No. of Credits: 165

DATE 16/10/2020

Department of civil Engineering
9th Board of studies Meeting
Minutes of meeting.

* 18CEC401T - Estimation and Quantity Surveying Course proposed with Lab component and approved by panel members. Course code and credit was modified as 18CEC401J - Estimation and Quantity Surveying Estimation (Credit 4). Therefore in Credit distribution added with 1 credit in professional core courses (Total No of Credit 165)

* 18CEC402T - Construction Engineering and management & professional Elective 5 Courses are interchanged between Semesters VII & VIII based on Panel members advice

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Semester VII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
HSMC	18MBH202T	Social Engineering	2	0	0	2
PCC	18CEC401T	Estimation and Quantity Surveying	3	0	0	3
PEC	18CEE_ _ _ _	Professional Elective 4				3
PEC	18CEE_ _ _ _	Professional Elective 5				3
OEC	18_ _ _ _ _ _ _	Open Elective 3				3
PROJ	18CEP107L	Design Project	0	0	4	2
					Total Credits	16

Semester VIII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC402T	Construction Engineering and Management	3	0	0	3
PEC	18CEE_ _ _ _	Professional Elective 6				3
PROJ	18CEP108L	Main Project	0	0	16	8
					Total Credits	14

L-Lecture T-Tutorial P-Practical

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25 MAR 2019

Total No. of Credits: 164

REGULATION 2018 -CREDIT DISTRIBUTION

S. No.	SUBJECT CATEGORY	CREDITS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1	IISMC	4	4				2	2		12
2	BSC	9	9	4	4					26
3	ESC	7	7	4	2					20
4	PCC			15	14	15	9	7		60
5	PEC					3	6	3	6	18
6	OEC					3	3	3		09
7	PROJ			1	1	2	2	2	8	16
8	MC			1	1	1	1			04
CREDITS TOTAL		20	20	25	22	24	23	17	14	165

DATE 16 10 2020

Department of civil Engineering
9th Board of studies Meeting
Minutes of meeting.

* 18CEC401T - Estimation and Quantity Surveying Course proposed with Lab Component and approved by panel members. Course code and credit was modified as 18CEC401J - Estimation and Quantity Surveying Estimation (Credit 4). Therefore in credit distribution added with 1 credit in professional core courses (Total No of Credit 165)

* 18CEC402T - Construction Engineering and Management & Professional Elective 5 Courses are interchanged between Semesters VII & VIII based on panel members advice

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REGULATION 2018 -CREDIT DISTRIBUTION

S. No.	SUBJECT CATEGORY	CREDITS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	4	4				2	2		12
2	BSC	9	9	4	4					26
3	ESC	7	7	4	2					20
4	PCC			15	14	15	9	3	3	59
5	PEC					3	6	6	3	18
6	OEC					3	3	3		09
7	PROJ			1	1	2	2	2	8	16
8	MC			1	1	1	1			04
CREDITS TOTAL		20	20	25	22	24	23	16	14	164

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M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
Approved by AICTE & Affiliated to Anna University
ISO 9001:2015 Certified Institution
Thalavapalayam, Karur, Tamilnadu.

REGULATION 2018

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS

Regulation 2018		Semester I	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	TECHNICAL ENGLISH	2	0	2	3

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Analyze the importance of communication in personal, professional contexts. Identify proper English pronunciation
CLR-2	Strengthen vocabulary and grammar. Enhance listening and writing comprehension. Review films and documentaries
CLR-3	Writing brief paragraphs using appropriate techniques. Enhance their English fluency in speaking
CLR-4	Write effective essays, stories. Experience workplace communication aspects
CLR-5	Research on a topic and write a comprehensible academic project reports. Make effective presentations

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify types, modes, channels and barriers of communication. distinguish different speech sounds, pronounce correctly
CO2	Identify, rectify the errors in the use of grammar and vocabulary. Improve listening and writing skills
CO3	Develop a topic idea into a cohesive paragraph with examples. Improve the fluency of speaking skills
CO4	Develop ideas into logical and coherent essays. Understand better the workplace culture
CO5	Identify the steps involved in writing an academic project report. List and practice skills need for making a presentation

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO2	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO3	1	3	1	3	3	2	1	3	3	3	-	3	-	-	-
CO4	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO5	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO (Avg)	1	3	1	3	3	2.8	1	3	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	COMMUNICATION	6
Definition, Process of communication - (Filling in-Class Worksheets) - Verbal and Non-Verbal Communication(Individual and Group Activities - Role play)-Other Types of Communication: General-Technical-Formal, Informal- External, Internal (Write upon a selected type of communication)- Listening, Speaking, Reading, Writing(Group activity (Newspaper) – Discussion and Feedback)- Communication and Language Barriers(Individual Activity- Sharing of Personal Experiences)-Body language(Mime).		
UNIT II	**VOCABULARY AND GRAMMAR**	**7**
Words with Foreign Roots, Word Formation – Inflectional, Derivational Prefixes, Suffixes(Quiz - Identifying the Borrowed roots and Their Meanings-Worksheet Exercise)-Synonyms and Antonyms and Standard Abbreviations(Context Based Activity / Learner Compiling Standard Abbreviations from Core Subject)-Homonyms and Homophones(Fun Activities – Worksheets- Cross Words)-Articles, Tenses(Exercise through Worksheets- Individual Activity -Peer Correction- Open Discussion)- Noun-Pronoun Agreement and Subject-Verb Agreement(Identifying and Learning through Error Analysis – Worksheets)-Misplaced Modifiers - Prepositions- Prepositional verbs and Phrasal verbs(Learn through Practice – Placing Same Modifier in Different Places in a Sentence)-Prepositions- Prepositional Verbs and Phrasal Verbs(Filling in-Class Worksheets)		
UNIT III	**DISCOURSE TECHNIQUES**	**7**
Sentence Structure, Phrases and Clauses(Exercise: Worksheet, Identifying Phrases, Clauses, Compound, Complex Sentences)-Developing Ideas into Paragraphs –Cohesion Markers(Identify Topic sentence in a Paragraph; Writing a Paragraph Based on a Topic)- -Inputs on Writing Precisely, Redundancies, Wordiness-Repetition-Clichés(Error Analysis and Editing)-Defining, Describing Technical Terms(Writing Definitions-Product and Process Description)-Inputs on Classifying/Categorising and Sequencing Ideas with Relevant Diagrams(Writing a Passage on the Given hints, Tree Diagram, Classification Table and Flow Chart)-Importance of Punctuation – Miscommunication –(Fun Activities - Worksheets for Appropriate Punctuation – Written)- Errors in Punctuation(Fun Activities - Worksheets for Appropriate Punctuation – Written)		
UNIT IV	**WORKPLACE COMMUNICATION**	**6**
Reading Comprehension, Guidelines questions (Referential, Critical,Interpretative)(Practice Excercise) - Précis-writing Guidelines(Practice Excercise) - Summarising(Group Activity (Oral/Written) on the Given Passages)-Essay Writing Guidelines: Introduction, Elaboration and Conclusion with Examples(Individual Activity (Written) on the Given Topic)-Organisational Report Writing - Progress Report- Guidelines(Writing a Progress Report)-Interview Skills(Mock Interview).		
UNIT V	**PROJECT WRITING**	**5**
Topics for Project Writing(Discussion)- Collection of Data – Avoiding Plagiarism-Authenticity and Credibility of Data(Collection of Data for Verification)- Guidelines for Writing: Outline- Objectives-Background- Methodology-Discussion-Documentation(Drafting an Outline & Preparing References)-Discussion Using Sample Project(Writing the First Draft on the Selected Topic)-Checklist for Project Format (PPT)(Self-Verification and Submission of Final Draft).		
	LIST OF EXPERIMENTS	**14**

1. Often Mispronounced sounds (Audio Visual Material - Listening to minimal pairs and reproducing)
2. Barriers of communication Language barriers – videos (Identifying the Language Barriers of communication –Written)
3. Short Biographical Account on Famous Personalities –Video(Oral Paraphrasing of the Content Shown)
4. Listening to Long Conversations, Daily Life (Identify Various Communication Contexts and Answering Questions – Collocation)
5. Introduction to Englishes -British and American –Videos (Discussion on Difference between British

	and American Words) 6. Speaking - Practice Activity – Brain Storming – Mind Mapping (Just a Minute) 7. Describing a Scene or Event –Videos (String Narration – Describing an Event or a Scene) 8. Technical Communication – Interpreting Data (Group Activity - Interpretation of Data - Oral Presentation) 9. Sample Case Studies for Work Ethics – Videos (Debate on the Videos Shown) 10. Learning Interview Techniques through Models (Mock Interview) 11. Guidelines for Preparing a PPT; Presentation Techniques (Preparing PPT on the Topic of Learners' Choice) 12. Formal Presentation
Text Book (s)	
1	Abirami K ,Technical English –, R.K.Publishers, Coimbatore.
Reference (s)	
1	Swan, Michael. Practical English Usage. OUP, 1995
2	Kumar Sanjay and PushpaLata. Communication Skills. OUP, 2011
3	CIEFL, Hyderabad. Exercises in Spoken English. Parts I-III. OUP
4	Anbazhagan K, Cauveri B, Devika M.P., English for Engineers. Cengage, 2016
5	www.mmm.english.com
6	www.onlinewriting.com/purdue
7	www.ieee.org/index.html

Regulation 2018		Semester I	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB101T	CALCULUS AND LINEAR ALGEBRA	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Apply the Matrices in problems of Science and Engineering
2	Utilize Taylor series, Maxima minima and Jacobian in solving real- time application problems
3	Utilize the concepts of radius of curvature, evolute, envelope in problems of Science and Engineering
4	Apply the concept of Differential Equations in problems of Science and Engineering
5	Applications of Sequences and Series in all problems involving Science and Engineering

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Apply Matrices, Eigenvalues and Eigen Vectors and Reduction of Quadratics form in Science and Engineering problem solving
CO2	Apply Maxima and Minima, Jacobian, and Taylor series to solve problems in Science and Engineering
CO3	Identify Radius, Centre, envelope and Circle of curvature and apply them in the problem solving
CO4	Solve the different types of Differential Equations in Science and Engineering applications
CO5	Apply convergence and divergence of series using different tests and apply sequences and Series in the problem solving

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	3	-	-	3	-	-	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	3	-	-	-
CO4	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO5	-	3	3	-	-	-	-	-	3	-	-	3	-	-	-
CO (Avg)	3	3	3	3	3	-	-	-	3	-	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	EIGEN VALUE PROBLEMS	9 + 3
Characteristic equation- Cayley-Hamilton theorem (excluding proof)- Eigen values and Eigen vectors of a real matrix – Properties- Orthogonal transformation of a symmetric matrix to diagonal form-Quadratic form-Reduction of quadratic form to canonical form by orthogonal transformation.		
UNIT II	FUNCTIONS OF SEVERAL VARIABLES	9 + 3
Partial derivatives-Euler's theorem for homogenous functions-Total derivatives-Differentiation of implicit functions-Jacobians-Taylor's expansion-Maxima and Minima-Method of Lagrangian multipliers.		
UNIT III	APPLICATIONS OF DIFFERENTIAL CALCULUS	9 + 3
Curvature and Radius of curvature – Circle of curvature and Centre of curvature-Envelope- Evolute as Envelope of Normals.		
UNIT IV	DIFFERENTIAL EQUATIONS OF SECOND ORDER	9 + 3
Second order linear differential equations with constant coefficients- Particular Integrals for x^n, e^{ax}, cosax/sinax, e^{ax}cosbx/e^{ax}sinbx - Method of variation of parameters-Cauchy and Legendre's linear equation-Simultaneous first order linear equations with constant coefficients.		
UNIT V	SEQUENCES AND SERIES	9 + 3
Sequences: Definition and examples-Series : Types and Convergence - Series of positive terms-Test of convergence: Comparison test, D'Alembert's ratio test, Integral test, Rabee's Root test and Log test-Alternating series-Leibnitz's test-Series of positive and negative terms(Alternating series)-Absolute and Conditional convergence.		

Text Book (s)	
1	B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
Reference (s)	
1	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008
2	N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008
3	G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson,Reprint, 2002
4	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010

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Regulation 2018		SemesterI/Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18PYB101J	PHYSICS	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Identify the applications of electric field on materials
CLR-2	Identify the applications of magnetic field on materials
CLR-3	Identify the significance of quantum theory
CLR-4	Create insights to the concepts of optical effects
CLR-5	Analyze the working principle of lasers and optical fibers

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Identify the effect of charge dynamics
CO2	Analyze electromagnetic induction
CO3	Apply quantum mechanics to basic physical problems
CO4	Apply ray propagation and optical effects
CO5	Identify the applications of lasers and optical fiber

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTROSTATICS AND DIELECTRIC MATERIALS	9+3

Del-divergence-curl and gradient operations in vector calculus-Gauss-divergence and Stoke's theorem-Electric field and electrostatic potential for a charge distribution-Gauss' law and its applications-Laplace's equations for electrostatic potential-Poisson's equations for electrostatic potential-Solving Problems-Concepts of electric current-Continuity equation-Laws of magnetism-Faraday's law-Ampere's law-Maxwell's equations-Solving Problems-Polarizations, permeability and dielectric constant -Polar and non-polar dielectrics -Types of polarization-Frequency and temperature dependence-Internal field in a field-Clausius-Mossotti equation-Solving Problems.

UNIT II	MAGNETIC AND SUPERCONDUCTING MATERIALS	9+3

Magnetization, permeability and susceptibility-Classification of magnetic materials-Ferromagnetism-Concepts of ferromagnetic domains –Hysteresis-Solving Problems -Properties and applications of ferromagnetic materials -Hard and soft magnetic materials -Ferrimagnetic materials - Magnetic bubbles – Ferrites- Solving Problems-Superconductivity -Properties of superconductivity -Type I & Type II superconductors-High Tc superconductors – SQUID – CRYOTRON-MAG LEV-Solving Problems.

UNIT III	QUANTUM PHYSICS	9+3

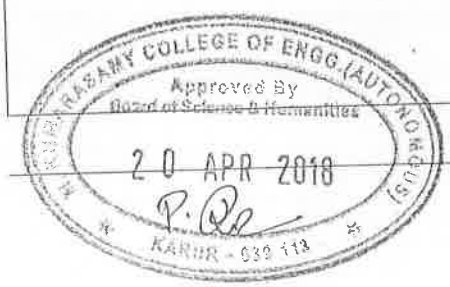
Introduction to Quantum mechanics-Explanation of wave nature of particles-Black body radiation-Compton effect-Solving Problems-Photoelectric effect-de Broglie hypothesis for matter waves - Physical Significance of wave function -Time independent Schrödinger's wave equation -Time dependent Schrödinger's wave equation -Solving Problems-Particle in a 1 D box -Normalization - Born interpretation of wave function -Properties of Matter waves-Verification of matter waves-G.P. Thomson Experiment-Solving Problems.

UNIT IV	WAVE OPTICS	9+3

Introduction to interference-Introduction to diffraction-Fresnel diffraction-Fraunhofer diffraction-Fraunhofer diffraction at single slit-Fraunhofer diffraction at double slit-Solving Problems-Fraunhofer diffraction at multiple slit-Diffraction grating-Characteristics of diffraction grating-Applications of diffraction grating-Polarization by reflection-Polarization by double refraction-Solving Problems -Scattering of light-Circular polarization-Elliptical polarization-Optical activity-Fresnel's relation -Brewster's angle--Solving Problems.

UNIT V	LASER AND FIBER OPTICS	9+3

Absorption and emission processes-two level-Einstein's theory of matter radiation A and B coefficients-Characteristics of laser beams-Amplification of light by population inversion-Threshold population inversion-Essential components of laser system and pumping mechanisms-Solving Problems-Nd: YAG laser-Semiconductor laser-CO_2laser Vibrational modes- CO_2 laser-energy level-Optical fiber-physical structure-Total internal reflection-Solving Problems-Numerical aperture - Acceptance angle-Losses associated with optical fibers-Classification of optical fibers-Optical fiber communications system-Optical sensors-Solving Problems.



LIST OF EXPERIMENTS	30
1. Basics of experimentation 2. Determine dielectric constant of the sample 3. Calibrate Ammeter using Potentiometer 4. Calibrate voltmeter using Potentiometer 5. Determine the energy loss of magnetic materials using B-H curve experiment 6. Determine Planck's Constant 7. Study of I-V characteristics of a light dependent resistor (LDR) 8. Determine wavelength of monochromatic light by Newton's ring 9. Determine particle size using laser 10. Determine wavelength of using diffraction grating 11. Determine wavelength for a given laser source 12. Study of numerical aperture and acceptance angle of optical fiber 13. Mini project	

Text books/ References:

1	David Jeffery Griffiths, Introduction to Electrodynamics, Revised edition, Pearson, 2013
2	Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th edition, 2012
3	David Halliday, Fundamentals of Physics, 7th edition, John Wiley & Sons Australia, Ltd, 2004
4	Berg and Resnick, Quantum Physics: Of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Edition, 1985

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Regulation 2018		Semester I /Semester II	Total Hours			90
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
B	18CYB101J	CHEMISTRY	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- Apply the basic principles of chemistry at both atomic and molecular levels in understanding the concepts related to the engineering field.
- Integrate the chemical principles in their projects undertaken in their respective fields
- Enhance the quality of a materials used in the product from the technological aspects for societal applications

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Identify the suitable polymeric materials fabrication processes in various application
CO2	Apply the basic principle of inorganic chemistry at the atomic and molecular levels
CO3	Apply the various thermodynamic and kinetics concepts to real system
CO4	Assemble a battery through the understanding of electrochemical principles
CO5	Catagorize the Engineering materials for their applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ENGINEERING ORGANIC MATERIALS	9*+3*

Polymer – Introduction- classification(based on molecular weight, structure and usage)- types of polymerization(Addition, Condensation and Copolymerisation)-crystallinity, melting point and glass transition temperature-mechnism of polymerization(free radical addition polymerization)-elastomer- structure and curing(vulcanization)- Fabrication and molding of polymers(Injection molding and blow molding)- Engineering plastics – PE, PVC, PMMA, Phenol formaldehyde resin , urea formaldehyde resin(Preparation, properties and uses)- Industrial applications of polymers.

UNIT II	COORDINATION AND ORGANOMETALLIC COMPOUNDS	9*+3*

Co-ordination compounds – Introduction- nomenclature- types of ligands (mono, di and poly dendate ligands)- isomerism(structural and stereo isomerism) – theories of bonding(Werner and Sidgwick Pouvell theory(EAN rule)) – applications – EDTA titration – Organometallic compounds - synthesis(organo zinc, organo Lithium and Organo magnesium) – Applications (18 electron rule, Ziegler Natta Catalyst and Hydroformylation)

UNIT III	THERMODYNAMICS AND KINETICS	9*+3*

Introduction- first and second law of thermodynamics – Gibbs –Helmholtz equation – Clausius clapeyron equation – Maxwell relations – Vant hoff isotherm and Isochore (problems also)- Kinetics- Introduction- types of reactions(opposing, consecutive and parallel reactions)- chain reactions (HBr and HCl formation)- Applications of kinetics and thermodynamics.

UNIT IV	ENGINEERING ELECTROCHEMISTRY	9*+3*

Introduction- Conductors and its types - cells (Electrolytic and Electrochemical cells) – Standard electrode potential- Nernst equation of an electrode- types of electrodes (SHE and Calomal electrode)- Batteries –Types (Primary, Secondary, Flow and reserve battery)- Examples (Lead acid battery, Ni-Cd battery, Lithium battery, Lithium sulphur battery and Hydrogen- Oxygen fuel cells)- Graphene.

UNIT V	INDUSTRIAL APPLICATIONS OF CHEMISTRY	9*+3*

Cement (Types, manufacture and properties) – Paints (constitutions and functions)- Lubricants- types- mechanism – properties-abrasives – types –Diamond, Corundum, emery, garnet, quartz, Silicon carbide, carborundum-boron carbide, alundum (preparation, properties and uses) –applications – Basics of biosensor and biochips.

LIST OF EXPERIMENTS	30

1. Determination of total , permanent and temporary hardness of water sample (EDTA method)
2. Determination of alkalinity in water sample- Indicator method
3. Determination of chloride content of water sample by Argentometric method(Mohr's method)
4. Determination of dissolved oxygen content of water sample by winkler's method
5. Conductometric titration of strong acid with strong base
6. Conductometric titration of mixture of acids

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7. Determination of strength and amount of Hydrochloric acid- pH metry
8. Estimation of strength and amount of ferrous ion by potentiometric method
9. Determination of molecular weight of a polymer by viscometry method
10. Estimation of ferrous ion by colorimetry.
11. Cement analysis

Text / Reference (s) books:

1	B.L.Tembe, Kamaluddin and M.S.Krishnan , "Engineering chemistry"
2	S.S. Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd, New Delhi (2009).
3	P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., NewDelhi (2012).
4	Shashi Chawla, Engineering Chemistry: Dhanpat Rai &Co., 3rd Edition, 2015
5	www.nptel.ac.in

Regulation 2018		Semester I /Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES101J	ENGINEERING GRAPHICS (CIVIL)	1	0	4	3

Course Objective (s):

1. Construct ellipse, Parabola, hyperbola, cycloid and involutes.
2. Sketch the projection of points, straight lines and plane surfaces.
3. Sketch the Projection of simple solids like prisms, pyramids, cylinder and cone
4. Sketch the sectional solids and developing the lateral surfaces of simple solids
5. Understand the three dimensional drawing of simple solid by isometric projection and perspective projection, and convert isometric projection to orthographic projection.

Course Outcome (s) (COs):

CO1	Apply engineering graphic fundamentals to draw/evaluate engineering curves.
CO2	Draw the graphics of engineering parts with point, line and plane projections
CO3	Draw projection of solid objects like prisms, cylinders, pyramids and cones used in engineering objects
CO4	Develop the lateral surfaces of the sectional solids.
CO5	Create 3D part models using isometric and perspective projection.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	2	3	2	2	-	3	3	3
CO2	3	2	3	2	2	-	1	2	3	2	-	3	3	3
CO3	3	2	3	2	3	-	1	2	3	2	-	2	3	3
CO4	3	2	3	2	3	-	1	2	3	2	-	2	3	2
CO5	3	2	2	2	2	-	1	2	2	2	-	3	3	2
CO (Avg)	3	2	2.6	2	2.4	-	1.2	2.2	2.6	2	-	2.6	3	2.6

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PLANE CURVES	9
Principles of Engineering Graphics - Lettering - dimensioning - Curves used in engineering practices: Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes – Drawing of tangents and normal to the above curves.		
UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACES	9
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations. Projection of polygonal surface and circular lamina inclined to both reference planes.		
UNIT III	PROJECTION OF SOLIDS	9
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.		
UNIT IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	9
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.		
UNIT V	ISOMETRIC PERSPECTIVE AND ORTHOGRAPHICS PROJECTIONS	9
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method. Isometric to orthographic multi-view.		

Text Book (s)

1	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2010).
2	K. Venugopal& V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 15th edition (2018).

Reference (s)

1	1. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications, 2010.
2	2. R. L Jhala "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2015.
3	3. DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.
4	4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
5	5. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2009.

List of Expertiments.

1	Spiral and involutes using bspline or cubic spline
2	Plan of residential building
3	Simple steel truss
4	Isometric projection of simple objects
5	Creation of 3D model
6	Orthographic projection of given 3D object
7	Projection of planes with inclination to reference plane
8	Solids with inclination to one reference plane
9	Section view of simple solids
10	Development of solids

Regulation 2018		Semester I / Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J(R)	PROGRAMMING FOR PROBLEM SOLVING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	Learn programming using a structured programming language
CO2	Provide exposure on C programming.
CO3	Introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

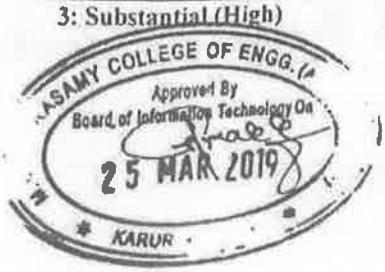
At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	INTRODUCTION	6
Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems– Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.		
UNIT II	**C PROGRAMMING BASICS**	**6**
Structure of a 'C' program – Tokens – Data Types – Operators –Input and Output operations – Decision Making and Branching – Looping statements.		
UNIT III	**ARRAYS AND STRINGS**	**6**
Arrays: Declaration – Initialization – One dimensional and Two dimensional arrays – String: String Declaration and Initialization–String Functions.		
UNIT IV	**STRUCTURES AND POINTERS**	**8**
Introduction to Structures-Need for Structure Data type – Structure: Definition, Declaration – Structure vs Union. Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays –Null Pointer – Pointer to Structures.		
UNIT V	**FUNCTIONS**	**4**
Function – Definition of function – Declaration of function – Function Prototype – Pass by value – Pass by reference.		
LIST OF EXPERIMENTS		**15**
1. Programs on Operators 2. Programs on Control statements 3. Programs on one Dimensional Array 4. Programs on Two Dimensional Array 5. Programs on String Handling 6. Programs on Function using Call by Value 7. Programs on Function using Call by Reference 8. Programs on Pointers 9. Programs on Structures 10. Programs on Union		

Text Book (s)

1	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2	PradipDey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009

Reference (s)

1	Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
2	Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
3	Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
4	Yashavant P. Kanetkar. " Let Us C", BPB Publications, 2011.

Regulation 2018		Semester I / Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J	PROGRAMMING FOR PROBLEM SOLVING	1	0	4	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	To learn programming using a structured programming language
CO2	To provide exposure on C programming.
C03	To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	1
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	1
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	1
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	1
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	1
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO C	9

Evolution of Programming & Languages - Problem solving through programming - Creating algorithms - Drawing flowcharts - Writing pseudocode - Evolution of C language, its usage history - Input and output functions: Printf and scanf - Variables and identifiers - Expressions, Constants - Keyword ,Single line and multiline comments- Values, Names, Scope - Binding, Storage Classes - Input and Output Statement - Numeric Data types - Non-Numeric Data types: char string - Non-Numeric Data types: string - Increment operator - decrement operator - Comma, Arrow and Assignment operator - Sizeof operator - Bitwise operators - Relational Operators - logical Operators - Conditional Operators - Operator Precedence

UNIT II	CONTROL STATEMENT AND ARRAY	9

If statement in expression - L value and R value in expression - Control Statements – if and else – else if – nested if - switch case - Iterations – While loop - do..While loop - For loop - Goto, break, continue - Array Basic and Types - Array Initialization and Declaration - Initialization: one Dimensional Array, Accessing - Indexing one Dimensional Array Operations - Initializing and Accessing 2D Array - Initializing Multidimensional Array - Array Advantages and Limitations

UNIT III	STRINGS AND FUNCTIONS	9

String Basics - String Declaration and Initialization - String Functions: gets(), puts(), getchar() - putchar(), printf()atoi(),, strlen()streat(), stremp()sprint(), sscanf()strepy(), strstr()Strrev(), strtok()Functions basics - Functions declaration and definition - Types: Call by Value - Call by Reference - Function with Arguments and no Return Values - Function without Arguments and no Return Values - Function with Arguments and Return Values - Function without Arguments and Return Values - Passing Array to Functions - Returning array from functions - Formal and Actual Parameters - Recursion Functions - Advantages of using Functions

UNIT IV	POINTERS	9

Pointers Basics - Address operator - Pointer Declaration - dereferencing pointers - Size of Pointer Variable and Pointer Operator - Void Pointers and size of Void Pointers - Arithmetic Operations - Incrementing Pointers - Constant Pointers - Null Pointers - Pointers to array elements - Pointers to strings - Function Pointers

UNIT V	STRUCTURES AND UNIONS	9

Structure basics & declaration - Initializing Structure, Accessing members - Nested structure - Array of structure - Accessing elements in a structure array - Passing Array of structure to function - Union Basic and declaration - Accessing Union Members - file: opening, defining - File closing, File Modes, File Types - Writing contents into a file - Reading file contents - Appending an existing file - File permissions and rights - Changing permissions and rights

LIST OF EXPERIMENTS	15

1. Programs on Operators
2. Programs on Control statements

3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array
5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Function prototypes
9. Programs on Passing and returning Array to Functions
10. Programs on Recursion Functions
11. Programs on Pointers
12. Programs on Structure
13. Programs on Union
14. Programs on Files

Text Book (s)

1	Zed A Shaw, Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C), Addison Wesley, 2015
2	Bharat Kinariwala, TepDobry, Programming in C, eBook
3	W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd ed. Prentice Hall, 1996

Regulation 2018		Semester I / II	Total 3ours			75
Category	Course Code	Course Name	3ours / Week			C
			L	T	P	
S	18MES102J	BASIC CIVIL AND MECHANICAL ENGINEERING (CIVIL)	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

- Select building materials and identify the components of a building
- Identify the various transportation systems, bridges, dams and water supply system
- Apply the concept of Harnessing energy from various energy sources
- Know the working of IC engines and identify the sub system requirements
- Apply manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

Course Outcome (s) (COs):

CO1	Identify the building materials and its applications
CO2	Identify different transportation system, water supply system and its applications
CO3	List the basic components and analyze the working of major power plants
CO4	Identify the working of IC engines and understand the need of various auxiliary systems
CO5	Identify manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	-	3	3	-	-	-	-	3	3	-
CO2	3	-	3	-	3	3	3	-	3	-	-	3	3	-
CO3	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3		3		3	3	3		3			3	3	

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (high)

UNIT I	BUILDING MATERIALS	9

Introduction to Civil Engineering, Building Materials, History, Disciplines in Civil Engineering, Early constructions and development over time, Ancient Monuments: Peruvudaiyar or Brihadeeswarar Temple, Kallanai dam Grand Anicut, Taj Mahal, Golconda fort, Angkor Wat, Pyramids of Giza, Colosseum Development of various materials, Methods of Construction, Building Materials - Stone – Classification of Rocks, Quarrying, Dressing, Properties and Uses of Stone Mortar, Plain and Reinforced Cement, Concrete Grade and properties and uses, Necessity of Special Concrete, Self Compacting Concrete, Construction Chemicals (Plasticizers), Recycling: construction, demolition wastes, Buildings, Classification of Buildings, Selection of site for a building, Components of Buildings, Soil, General types of soil, Bearing Capacity, Factors affecting bearing capacity, Foundations: Functions, General types of, foundation, Shallow foundations

UNIT II	TRANSPORTATION AND WATER SYSTEM	9

Cement concrete flooring, Marble flooring, Granite flooring, Ceramic tile flooring, Roofs: Types of roofs, Madras terrace roof, Reinforced concrete roofs, Trussed roof, Roof Coverings: Types, Weathering course: Types, Mode of Transportation - Highways - Classification of Roads, Cross section details of flexible pavements, Railways – Zone and Headquarters, Permanent way and its requirement, Components of Permanent way, Bridges: Components of Bridge, Types, Dams: Purpose, Classification, Gravity dams - Advantages and Disadvantages, Elements of protected Water Supply system, Objective, Quantity of water, Design period, Per-capita demand, Factor affecting per capita demand, Sources of Water Supply, Standards of Drinking water, Drinking Water Treatment: Objectives, Treatment plant process, Sewage: Method of collection, Sewage treatment and disposal

UNIT III	POWER PLANTS	9

Coal based thermal Power Plant: layout, components description,working, advantages, disadvantages, Hydro Electric power plant: layout, components description, working, advantages and disadvantages, Nuclear power plant: Nuclear fission and fusion reactions, Nuclear reactor, components description, Layout, working, merits and demerits of boiling water reactor , Layout, working, merits and demerits of pressurized water reactor, Gas turbine power plants:componentsdescription,working and types gas turbines, methods to improve performance, Layout and working of open cycle plant with intercooling, reheating, regeneration, Solar Thermal power plant: layout of Flat plate collector based plant, central receiver type plant, advantages, disadvantages, Wind energy conversion system – wind turbine types, Working, advantages and disadvantages, Ocean Thermal Energy Conversion system: layout of open cycle , Layout of closed cycle, advantages, disadvantages

UNIT IV	INTERNAL COMBUSTION ENGINES	9

Engine: Classification,operations of 2 stroke & 4 stroke, Comparison of SI & CI engines, Fuel supply system and Battery ignition system. Magneto ignition system of SI engine, Working of a simple carburetor, GDI, MPFI, CRDI, Lubrication system of an engine, Functions and Working of mist and forced feed lubrication system, Cooling system of an engine – Working of air cooled (fins), Water cooled engines (forced circulation), Alternate fuels for IC Engines. Liquid fuels: methanol, ethanol, vegetable oil, Biodiesel, Gaseous fuel: Hydrogen, CNG, LPG, properties, advantages, disadvantages, Emissions from engine – Emission standards – Euro, BS, Emission control measures – Catalytic converter, Exhaust gas recirculation, Introduction to electric vehicles, Hybrid and autonomous vehicles

UNIT V	CASTING AND FORMING PROCESS	9

Casting introduction and history, Expandable mold casting process , Production steps in a typical sand-casting process, terms including patterns and core, Other expendable mold casting: shell molding, vacuum molding, expanded polystyrene process, Investment casting, Permanent mold casting: hot chamber and cold chamber

die casting & Permanent mold casting:Semi centrifugal and centrifuge casting, Metal forming introduction and its classification, metals and alloys,Bulk deformation: hot, cold forging processes, hot rolling processes,cold rolling processes, Rolling mill classification, hot and cold extrusion processes, wire and bar drawing processes, Sheet metal working, applications. Cutting operations: shearing, blanking, punching, cutoff, parting, slotting, perforating, notching, trimming, shaving, fine blanking, Bending operations: V-bending, edge bending, flanging, hemming,seaming, curling, spring back effect, Drawing operations, its defects, coining, embossing, ironing, lancing, twisting	
Text Book (s)	
1	Dr.V.Rameshbabu,"Basic Civil and Mechanical Engineering", VRB Publishers pvt ltd, 2017
Reference (s)	
1	SeropeKalpakjian, Steven Schmid," Manufacturing Processes for Engineering Materials", Pearson, 2016
2	Drbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, "Power Plant Engineering", Kluwer Academic Pub., 1995
3	Andy Walker, "Solar Energy", John Wiley & Sons, 2013
4	John B. Heywood, "Internal Combustion Engine Fundamentals", Tata McGraw Hill Education, 2017
5	Kumar. T, LeenusJesu Martin and Murali. G, "Basic Mechanical Engineering", Suma Publications, Chennai, 2007.

LIST OF EXPERIMENTS

Total: 30hours

1.	Study of wood types, carpentry tools, operations and safety precautions.
2.	To make various carpentry joints like T-joint, lap joint, bridle joint, mortise tenon joint and etc.
3.	Study of pipeline joints, its location and functions in household fittings.
4.	Preparation of single tap, multi tap and shower connection by using GI and PVC pipes.
5.	Study about basics of fitting process, tools and method of producing models.
6.	Preparation of square, half round, step, V, T fitting of two metals by using fitting tools.
7.	Study of cutting, bending operations and tools used in sheet metal processes.
8.	To make trays, cone and funnel by using sheet metal operations.
9.	Study of welding types, tools, equipments and welded joints.
10.	Preparation of butt joints, lap joints and T-joints by shielded metal arc welding.
11.	Study about the types, properties and uses of brick, stone and cement.
12.	Study about water supply, distribution System, water treatment plant, sewage system
13.	Study about the basics of casting processes and equipments.

Regulation 2018		Semester - I / Semester - II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18EES101J(R)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

NIL

Course Objective (s): The purpose of learning this course is to:

1	Gain the knowledge about D.C and A.C circuits.
2	Impart the fundamentals of electrical machines.
3	Study the fundamentals of semiconductor devices
4	Study the working concepts of measuring instruments.
5	Know about digital logic concepts and operational amplifier.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Apply the concepts of ohm's law and Kirchhoff's law in DC and AC circuits
CO2	Explain the basic concepts of DC motor, DC generator, Transformer and Induction motor.
CO3	Summarize the nature of semiconductor devices.
CO4	Interpret the concept of measuring devices like PMMC, MI, energy meter and wattmeter.
CO5	Infer the concept of electronics devices and conversion techniques

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1
CO2	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO3	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO4	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO5	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO (Avg)	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved On 15 OCT 2020 Board of Electrical and Electronics Engineering KARUR - 639 113

UNIT I	ELECTRICAL CIRCUITS	9

Electrical quantities: Resistors, Inductors, Capacitors - Ohm's Law - Kirchoff's Laws -Series and Parallel circuits - Analysis of DC circuits: Mesh & Nodal analysis, Thevenin's Theorem, Norton's Theorem & Maximum Power Transfer Theorem, Star delta Transformation, RL & RC Transient Analysis. Introduction to AC Circuits: Waveforms and RMS Value – Power and Power factor- Introduction to three phase systems – Types of connections, Relationship between line and phase values.

UNIT II	ELECTRICAL MACHINES	9

Faraday's laws- Construction, Principle of Operation, Basic Equations of DC Generators, DC Motors – Two Point & Three Point Starter – Construction, Working and EMF Equation of Single Phase Transformer – Construction and Working of AC Generator – Three Phase Induction Motor: Construction and Working of Squirrel Cage and Slip Ring Induction Motor – Single Phase Induction Motor (Split Phase, Capacitor Start Induction Motor).

UNIT III	ELECTRONIC DEVICES	9

Intrinsic and Extrinsic Semiconductors – PN junction diode , Zener diode and its Characteristics – Operation of Half Wave, Full Wave and Bridge Type Rectifiers – Bipolar Junction Transistor: Configurations and Characteristics of CB, CE, CC – Construction and Operation of JFET, MOSFET.

UNIT IV	MEASUREMENTS	9

Basic Principles and Classification of Instruments – Construction and Working of PMMC, MI Instruments (Attraction & Repulsion type) – Principle of Operation of Dynamometer Type Wattmeter, Induction Type Energy Meter – Instrument transformer – CRO – Megger.

UNIT V	DIGITAL & INTEGRATED CIRCUITS	9

Number Systems – Boolean Theorems– Logic Gates – Half Adder and Full Adder Circuit – Flip-Flops: RS, JK, T and D – A/D Converter (Successive Approximation Type) – D/A Converter (Binary Weighted Type) – Op-Amp : Functional Block and Types (Inverting , Non-Inverting & Differential Amplifier).

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Electrical and Electronics Engg. Approved On 15 OCT 2020 Board of Studies KARUR - 639 113

LIST OF EXPERIMENTS	15

1. Verification of Ohm's & Kirchoff's Laws
2. Types of Wiring (Fluorescent Lamp & Staircase)
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Characteristics of PN Junction Diode
6. Characteristics of Common Base Configuration.
7. Characteristics of Common Emitter Configuration.
8. Measurement of Ripple Factor: Half Wave & Full Wave Rectifier.
9. Study of AC and DC Machines
10. Verification of Logic Gates
11. Study of PMMC and MI Meters

Text Book (s)

1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering," Tata McGraw-Hill, 2012
2	Sawhney, A.K., "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2011.

Reference (s)

1	Dash.S.S, Subramani.C, Vijayakumar.K, "Basic Electrical Engineering", Vijay Nicole, 1st Edition, 2013.
2	Jegatheesan.R, "Analysis of Electric Circuits", Tata McGraw-Hill, 2014.
3	Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd Edition, 2010.

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Board of Electrical and Electronics Engineering Approved On 15 OCT 2020 KARUR - 639 113

Regulation 2018		Semester I/ Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week L	T	P	C
S	18EES101J	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Analyze given electric circuits consisting of active and passive components.
2	Identify the parts, functions and working of motors, generators and transformers that function in AC and DC.
3	Utilize the basic electronic devices and circuits.
4	Utilize the working concept of measuring instruments.
5	Build simple logical circuits using Boolean expressions. Identify elements in Integrated circuit.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss basic theory utilized in electrical circuits and its circuits.
CO2	Describing working principle of direct current and alternative current machines such as transformers, motors and generators.
CO3	Operate the basic electronic devices. Identify their uses and construction features.
CO4	Interpret the concept of measuring devices like PMMC, MI ,energy and wattmeter.
CO5	Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a Integrated circuit.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	2	-	2	2	2	2	-	2	2	3
CO2	3	2	1	1	2	-	2	2	2	2	-	2	2	2
CO3	3	-	1	1	2	-	2	2	2	2	-	2	3	2
CO4	3	-	1	1	1	-						2	2	2
CO5	3	2	2	2	2	-	2					2	2	2
CO (Avg)	3	2	1.2	1.2	1.8	-						2	2.2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	ELECTRICAL CIRCUITS	12

Introduction to DC and AC circuits, Active and Passive two terminal elements, Ohms law,Voltage-Current relation, Power, Energy, R,L,C Circuits, Voltage and Current Sources, Kirchoff's current law, Kirchoff's voltage law, Problem Solving Session, Mesh Current Analysis, Nodal Voltage Analysis, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Star- Delta Transformation, Problem Solving Session, Resistive Circuit Analysis, Superposition, Convolution, RL Circuit Transient Analysis, RC & RLC Transient Analysis , Three Phase Systems, Star and delta Connections, Relation between Line and, Phase, Problem Solving Session.

UNIT II	DC MACHINES & AC MACHINES	12

Sinusoids, Generation of AC, Average, RMS values, Form and peak factors, Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor, Magnetic materials, B-H Characteristics Simple magnetic circuits, Faraday's laws, induced emf and inductances. 1 - Phase transformers: Construction, types, ideal, practical transformer, EMF equation, Regulation, Efficiency, Problem Solving Session, Construction, working of DC Generators, Types of DC generators, Characteristics of Generators, Applications of DC generator, Working and types of DC motors, Characteristics , Two point starter and Three point starter, Problem Solving Session, AC generators (Alternators), Construction, working, Characteristics of Alternators, Losses, Single Phase motors: Split phase induction motor & Capacitor start induction motor, Working and types of single phase AC motors, Squirrel Cage and Slip ring induction motor, Types of AC starters (Autotransformer, star-delta and Rotor resistance starter), Problem Solving Session.

UNIT III	ELECTRONIC DEVICES	12

Overview of semiconductors, Intrinsic and Extrinsic semiconductors, Operation of PN Junction diode , Characteristics of PN Diode, Operation of Zener diode, Characteristics of Zener Diode, Overview of diode circuits, Operation of Half -wave rectifier, Half wave : Ripple factor Expression, Advantages, Disadvantages, Operation of Full-wave rectifier, Full wave : Ripple factor Expression, Advantages, Disadvantages, Bridge type rectifier operation, Comparison of rectifier circuits, Overview of filters and its uses, BJT construction, operation, BJT characteristics (CB, CE and CC configurations) and uses, JFET construction, operation, JFET characteristics (Drain and Transfer characteristics), Depletion mode and Enhancement mode MOSFET construction operation, MOSFET characteristics (Transfer and output characteristics), Problem Solving Session.

UNIT IV	MEASUREMENTS	12

Methods of measurements – Overview, Types of Measurements: Primary, Secondary, Tertiary, Basic principles and Classification of Instruments- Indicating, Recording and Integrating, Construction and working of PMMC, PMMC-Torque Equation, Advantages, Disadvantages, Construction and working of MI Instruments, MI (Attraction type)-Operation, MI Attraction type-Advantages , Disadvantages, MI (Repulsion type)- Operation, Torque Equation, MI (Repulsion type)- Errors, Advantages, Disadvantages, Overview of Instrument Transformers, Current Transformer, Potential Transformer, CRO, CRT, Operation of Dynamometer type watt meter, Advantages and Disadvantages, Operation of Induction type watt meter, Advantages and Disadvantages, Megger –Construction, Working, Measurement of Earth resistance

UNIT V	DIGITAL AND INTEGRATED DEVICES	12

Number systems, binary codes, Binary arithmetic, Boolean algebra, laws and theorems, Simplification of Boolean expression, Logic Gates and Operations, Simplification of Boolean expression, Problem Solving Session, SOP and POS Expressions, Standard forms of Boolean expression, Simplify using Boolean Expressions, Minterm and Maxterm, K - Map Simple Reduction Technique, Two, Three and Four Variable K-Map, Problem Solving Session, Half adder circuit, Full adder circuit, Flip-flops : RS , JK, T and D Flip-flops, A/D Converter-Successive Approximation , D/A Converter-Binary Weighted, Overview of Op-Amp, Op-Amp : Functional block & Types (Inverting, Non-inverting & differential amplifier).

LIST OF EXPERIMENTS	30

1. Verification of Kirchoff's Law
2. Verification of all Theorems,
3. Time Domain Analysis (RL, RC).

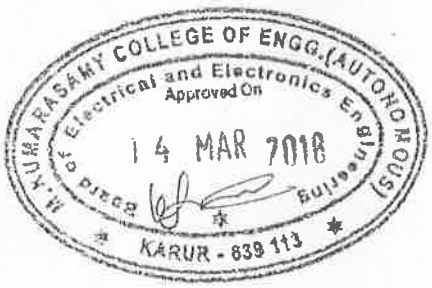
4. Types of wiring (Flourescent lamp,Staircase ,godown wiring),
5. Demo of DC Machine & Parts
6. Demo of AC Machine & Parts.
7. Characteristics of semiconductors
8. Measurement of Ripple factor (Half-wave and Full-wave),
9. Characteristics of CB and CE configurations
10. Demo of PMMC and MI Meters,
11. Waveform verification using CRO,
12. Measurement of Energy using Single phase Energy meter,
13. Verification of Boolean expression using logic gates,
14. Reduction using Digital Logic Gates,
15. Design and test of Inverting and Non-Inverting Amplifier using IC741

Text Book (s)

1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012

Reference (s)

1	Dash.S.S, Subramani.C, Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013.
2	Jegatheesan.R,Analysis of Electric Circuits, Tata McGraw-Hill, 2014.
3	P. S.Bimbhra ,Electrical Machinery,7th ed,. Khanna Publishers, 2011.
4	Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011.
5	Sawhney A.K., A Course in Electrical & Electronic measurements and Instrumentation,Dhanpat Rai and Co,2011.



Regulation 2018		Semester I/Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH101L	PROFESSIONAL SKILLS AND PRACTICES	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Equip students with different aspects of Presentation
CLR-2	Train students to use appropriate language for publics peaking.
CLR-3	Help students better understand basic leadership qualities and personality traits
CLR-4	Train the students to face interview confidently.
CLR-5	Make students understand how setting goals in life is important.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Make presentation in a formal way.
CO2	Speak with clarity and confidence, thereby enhancing their employability skills.
CO3	Enable students to understand different aspects of leadership and evaluate in their own strengths.
CO4	Clear the job interview successfully.
CO5	Realize that selecting goal is a fundamental component to long- term success of an individual.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO2	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO3	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO(Avg)	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PRESENTATIONS	5
Tips and Techniques for an Effective Presentation - Effective presentation structure - Types of Presentation - Verbal aspect of a presentation - Non-verbal aspect of a presentation – body language - Stress management during a presentation		
UNIT II	PUBLIC SPEAKING	5
Importance of Public Speech - Dealing with fear and Anxiety - Tips and Techniques for Public Speaking - Informative Speech - Delivering a Persuasive Speech - Dealing with audience questions		
UNIT III	LEADERSHIP SKILLS	5
Communication – Motivation – Delegating – Creativity – Responsibility - Commitment		
UNIT IV	INTERVIEW SKILLS	5
Preparing for a Job Interview - The Interview Process - Telephone Interviews - Interview Techniques - Mock Interview - Mock Interview		
UNIT V	GOAL SETTING	5
Types of goals - Reasons for goal setting - Goal Setting Process - S.M.A.R.T. goals - Tips and Techniques for Goal Setting - Trouble in Setting Goals		
LIST OF EXPERIMENTS		5
1. Make a presentation on a general topic 2. Give a persuasive speech 3. Exhibit your leadership qualities 4. Mock interview 5. Share your realistic short term and long term goals and the ways to attain them.		

Text Book (s)	
	NIL
Reference(s)	
1	Aruna Koneru, Professional Communication, Tata McGraw-Hill Publishing Company Limited, New Delhi
2	Professional Skills and Practice, Oxford University Press
3	https://www.skillsyouneed.com
4	https://www.Business English Site.com

Regulation 2018		Semester I/ Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH102L	GENERAL APTITUDE	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR1	Recapitulate fundamental mathematical concepts and skills
CLR2	Hone critical thinking skills by analyzing the arguments with explicit and implicit premises
CLR3	Sharpen logical reasoning through skillful conceptualization
CLR4	Identify the relationships between words based on their function, usage and characteristics
CLR5	Nurture passion for enriching vocabulary
CLR6	Acquire the right knowledge, skill and aptitude to face any competitive examination.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Build a strong base in the fundamental mathematical concepts
CO2	Identify the approaches and strategies to solve problems with speed and accuracy
CO3	Gain appropriate skills to succeed in preliminary selection process for recruitment
CO4	Collectively solve problems in teams and groups
CO5	Build vocabulary through methodical approaches
CO6	Enhance lexical skills through systematic application of concepts and careful analysis of style, syntax, semantics and logic

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO2	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO3	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO4	1	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO5	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO6	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO (Avg)	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-

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1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I		6
Types of numbers, Divisibility tests -Introduction to Significance of Verbal Aptitude in Competitive Examinations - LCM and GCD -Vocabulary enrichment techniques - Unit digit, Number of zeroes, Factorial notation - Vocabulary enrichment Techniques.		
UNIT II		6
Square root, Cube roots, Remainder - Identities - Contextual Vocabulary Exercise - Synonyms Fractions and Decimals, surds -Contextual Vocabulary Exercise -Antonyms		
UNIT III		6
Percentage Introduction - Sentence Completion Basic Level Exercises : Single Blank - Percentage Problems - Sentence Completion Basic Level Exercises : Double Blank - Profit and Loss - Cloze Test		
UNIT IV		6
Discount -Reading Comprehension – Introduction -Simple Interest - Reading Comprehension – Summary & Main Idea - Compound Interest, Installments - Reading Comprehension – Summary & Main Idea		
UNIT V		6
Logarithms Intro - Grammar Rules :A comprehensive Introduction - Logarithms Rules - Sentence Completion – Grammar - Linear Equations - Spotting Errors		

Text Book (s)	
1	Nil
Reference (s)	
1	Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002
2	Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010
3	Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition
4	Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014
5	Wiley's GMAT Reading Comprehension Grail, Wiley, 2016
6	Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition
7	Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013
8	Nishit K. Sinha, The Pearson Guide to Quantitative Aptitude and Data Interpretation for the CAT
9	Dinesh Khattar-The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations

Regulation 2018		Semester I	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM101T	CONSTITUTION OF INDIA	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Utilize the citizen's rights
CLR-2	Utilize the basic citizen's fundamental rights of freedom of speech, expression, equality, religion and privacy
CLR-3	Identify the Indian constitutional framework with union parliament, government and their functions and citizen's rights
CLR-4	Utilize the States functionality and provisions for the betterment of the individual and society
CLR-5	Identify the emergency provisions, the functions of election and public service commissions, identify the tax system

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify the basic provisions in the Indian constitution
CO2	List the fundamental rights, rights to equality, freedom, religion, culture, education and the right against exploitation
CO3	Identify the fundamental duties of the Union of India, President, Vice-President, Union Ministers and Parliament functions
CO4	Identify the power of states, its legislature, Governors role and the state judiciary
CO5	List the special provisions and functionality of election commission, public service commission, individual tax and GST

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	3	3	3	-	3	-	-	-
CO2	-	-	-	-	-	-	2	3	3	3	-	3	-	-	-
CO3	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
CO (Avg)	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INDIAN CONSTITUTION	3
Meaning of the Constitution law and Constitutionalism- Historical perspective of the Constitution of India- Salient features and characteristics of the Constitution of India Citizenship- Scheme of the fundamental rights- Scheme of the Fundamental Duties and its legal status		
UNIT II	**FUNDAMENTAL RIGHTS**	**3**
The Directive Principles of State Policy- Scheme of the Fundamental Right to Equality- Scheme of the Fundamental Right to certain Freedom under Article 19- Scope of the Right to Life and Personal Liberty under Article 21- Union Government, Union Legislature (Parliament)- LokSabha and RajyaSabha (with Powers and Functions), Union Executive		
UNIT III	**POWERS AND FUNCTIONS OF CENTRAL GOVERNMENT**	**3**
President of India (with Powers and Functions)- Prime Minister of India (with Powers and Functions) - Union Judiciary (Supreme Court)- Jurisdiction of the Supreme Court - State Government, Legislature, Legislative Assembly, Legislative Council- Powers and Functions of the State Legislature, State Executive- Governor of the State (with Powers and Functions)		
UNIT IV	**POWERS AND FUNCTIONS OF STATE GOVERNMENT**	**3**
The Chief Minister of the State (with Powers and Functions)- State Judiciary (High Courts) Union Territory, Panchayat, Municipality- Scheduled and Tribal Areas- Co-operative Societies Consumer Rights - Consumer Protection Act		
UNIT V	**POWERS AND FUNCTIONS OF ELECTION AND SERVICE COMMISSION**	**3**
Local Self Government – Constitutional Scheme in India-Emergency Provisions : National, President Rule, Financial Emergency - Election Commission of India (with Powers and Functions) - The Union Public Service Commission (with Powers and Functions) - Amendment of the Constitutional Powers and Procedure -Income Tax, Goods and Services Tax		

Text Book (s)

	NIL

Reference (s)

1	DurgadasBasu, Introduction to the Constitution of India,Lexis- Nexis, 2015
2	Subash C Kashyap, Our Parliament, National Books Trust, 2011
3	Kaushal Kumar Agarwal, India's No 1 book on Tax : Simple Language Advanced Problems: Income Tax, Kindle, 2017
4	Vivek K R Agarwal, GST Guide for students: Making GST – Good and Simple Tax, Neelam Book House, 2017

Regulation 2018		Semester I&II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18GNM101L	Physical and Mental Health using Yoga	0	0	2	0

Prerequisite Course (s) Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	provide deeper insight into the curriculum of Yogic Sciences along with the practical applications of Yoga
CLR-2	intend that students should get familiar with the poses of Yogasanam.
CLR-3	Promote positive health in the Student through Yoga and enabling and imparting skill in them to practice and apply Yogic
CLR-4	practice for Health to general public and teach Yoga for Total personality development and spiritual evolution.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	increase the muscle strength
CO2	improve respiration, energy and vitality.
CO3	maintain a balanced metabolism and weight reduction.
CO4	maintain cardio and circulatory health.
CO5	improve athletic performance and protection from injury.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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	Introduction:	6
▪ Human Body- Meaning and its Importance in Yoga ▪ Definition of Anatomy and Physiology ▪ Cell: Structure & Function		
	General information, Different parts, Structure, Function and Effect of Yogic Practices.	24
▪ Tissues: Types, Structure & Function. ▪ Musculo-Skeletal System ▪ Digestive system ▪ Excretory system ▪ Respiratory system ▪ Circulatory system ▪ Nervous System ▪ Endocrinal system		

Text / Reference (s) books:

1.	Shirley Telles - A Glimpse of the Human Body The structure anf Functions, Swami Vivekananda Yoga Prakashana, Bangalore.
2.	Makarand Madhukar Gore - Anatomy and Physiology of Yogic Practices, Motilal Banarsidass, New Delhi, 2007
3.	Anne Waugh, Allison Grant - Ross and Wilson Anatomy and Physiology in Health & Illness, Churchill Livingstone; 2010

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Regulation 2018		Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	PROFESSIONAL ENGLISH	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Develop team spirit and stress management skill
CLR-2	Demonstrate the interpersonal skills of the learners
CLR-3	Make learners perform well in interviews
CLR-4	Enable them to listen well and express their ideas, opinions effectively in official contexts
CLR-5	Sharpen their reading comprehension skill
CLR-6	Strengthen their official written communication skill.

Course Outcome (s) (COs):

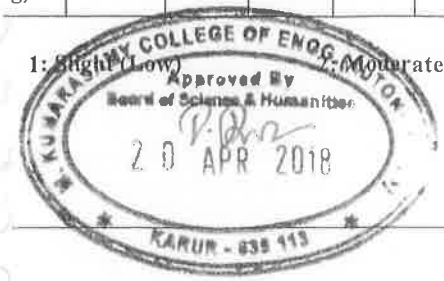
At the end of this course, learners will be able to:

CO1	Work in a team under any situation.
CO2	Practice interpersonal relationships in workplace
CO3	Face interviews confidently and successfully
CO4	Participate and excel in role plays, presentations and formal conversations.
CO5	Read and infer the meanings of technical and aesthetic passages.
CO6	Draft official letters, reports, memos, emails, etc.,

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO2	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO3	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO4	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO5	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO6	1	1	3	3	3	3	1	3	3	3	-	3	-	-	-
CO (Avg)	1	2.66	1.33	3	3	3	1	3	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	SOFT SKILLS	7

Introduction to Soft Skills(MCQ on Soft Skills)-Leadership Skills(Handling a Team) -Optimism & Business Etiquettes(Presentations on How to Handle Situations Effectively)-Team Management (Motivational Videos on Positive Thinking)- Time Management(Discussion on Real Time Hardships) -StressManagement(Handling Criticism)-Organizational Communication - Channels of Communication(Case Study).

UNIT II	LISTENING	7

Listening Skills: Active Listening, Passive Listening(Classroom Listening Activities)-Methods for improving Listening Skills, Listening and its process – Barriers to Listening(Innovative Practices and Strategies for Better Listening) – Listening to Pre-Recorded video/audio (Listening to Famous Motivational Speeches)- Listening to Reading in the Class - for Vocabulary - for Complete Understanding – for Better Pronunciation(Read aloud a Story or an Article to Listen and Complete the Task) - Listening for General Content – Listening to fill up Information(Listening –fill in the Form Activity) – Intensive Listening for Specific Purpose-Listening to Monologues(Listening to Announcements) -Extensive Listening(Listening to Business News).

UNIT III	SPEAKING	5

Defining Presentation and its Purpose; Audience & Local; Organizing Contents; Preparing Outline(Mini presentation)- Audio-Visual Aids; Nuances of Delivery; Body Language;(PPT Presentation) - Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice(Voice Modulation Practice)-Interviews &Its Types-Role Play(Mock Interview) -Group Discussion-Oral Presentations -Formal Conversations(Group Discussion Practice) .

UNIT IV	READING	5

Reading & Its Types- Techniques for Good Comprehension, Reading Comprehension(Reading Comprehension Exercises) - Cloze Test ,Reading Newspaper- Editorials & Business Articles (Cloze Test Exercises)- Inferring Meaning- Improving Comprehension Skills(Reading for Meaning) - Skimming and Scanning– Structure of the Text – Structure of Paragraphs(Skimming and Scanning Exercises) - Interpreting Visual Communication(Graphs, Charts, Tables)(Interpreting the Graphical images).

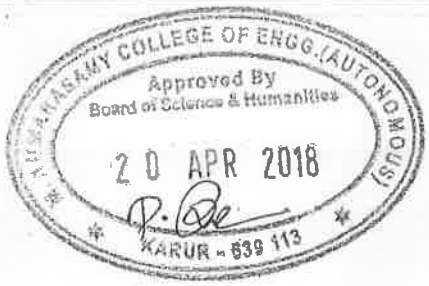
UNIT V	WRITING	5

Writing Official Letters(Invitation Letter (Accepting & Declining),Quotation, Ordering, Complaining, Seeking Clarification)(Business Letter Writing Exercises), Writing Official Letters(Permission – In-Plant Training)- Writing CV (Job Application)(Job Application Letter Exercise)- Essay Writing-Email Writing - Writing Reports & Proposal(Writing a Business Report)- Writing Circulars, Memos, Agenda & Minutes(Exercises on Writing Circulars, Memos, Agenda & Minutes).

LIST OF EXPERIMENTS	16

1. Videos on Stress Management (Stress Management Activities)
2. Videos on Team Spirit (Team Activities)
3. Listening to TED Talks(Listening to Business Interviews)
4. Listening to Business Presentation (Listening to Business Interviews)
5. Telephonic Conversation (Organizing a Meeting)
6. Product Launch (Persuasive Speech)
7. Business Conversations
8. Business Role Play Activities
9. Reading for Pleasure(Intensive Reading)
10. Extensive Reading(Briefing Favourite Self Help Books)

	11. Reading Newspaper articles(Reading Business Reports) 12. Reading Business Legends Success Formula(Read Between the Lines) 13. Writing an Advertisement (Writing Slogans for Products) 14. Error Correction Exercises (Formal Language expressions) 15. Business Vocabulary (Writing Official E-mails) 16. Writing Business Proposals (Writing Permission Letters)
Text Book (s)	
1	Abirami K, "Professional English", First Edition, R.K.Publishers, Coimbatore, 2019.
Reference (s)	
1	LinaMuhkopadhyay, et al., "English for Jobseekers" ,Cambridge University Press, New Delhi,2013
2	Brook Hart Guy , Business Benchmark Advanced Personal Study Book for BEC and BULATS, Cambridge
3	Mascull , Bill, Business Vocabulary in Use, Third Edition, Nov 2017
4	Emerson Paul, Business English Handbook ,Advanced, Macmillan
5	www.Business English Site.com
6	www.businessenglishpod.com



Regulation 2018		Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB102T	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	1	0	4

Prerequisite Course (s)

Calculus and Linear Algebra

Course Objective (s):

The purpose of learning this course is to:

1	Evaluate Double and triple Integral and apply them in problems in Engineering Industries
2	Evaluate Surface, Volume Integral and applications of Gauss theorem, Stoke's and Green's theorem in Engineering fields
3	To know the properties of Complex functions and apply them in all the Engineering fields
4	Evaluate improper integrals involving complex functions using Residue theorem and apply them in Engineering fields
5	Transform engineering problems into ODE, PDE and Integrals and solve them using Laplace / complex analytic methods

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Evaluate multiple integrals using change of variables
CO2	Apply techniques of vector calculus in problems involving Science and Engineering.
CO3	Apply complex analytic functions and its properties in solving problems
CO4	Evaluate improper integrals using Residue theorem involving problems in Science and Engineering
CO5	Apply techniques of Laplace Transforms and inverse transform for problems in Science and Engineering and Solving Ordinary Differential Equations

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	3	-	-	3	-	-	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	3	-	-	-
CO4	-	3	3	-	-	-	-	-	3	-	-	3	-	-	-
CO5	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO (Avg)	3	3	3	3	3				3	-	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	MULTIPLE INTEGRALS	9 + 3
Evaluation of double integration in cartesian and polar Coordinates - Evaluation of double integral by changing of order of integration - Area as a double integral (Cartesian and Polar) - Conversion from Cartesian to Polar in double integrals - Triple integration in Cartesian Coordinates - Volume as triple integral in Cartesian, Polar and Spherical Coordinates.		
UNIT II	**VECTOR CALCULUS**	**9 + 3**
Gradient,Divergence,Curl,Solenoidal,Irrotational fields - Directional derivative - Line integrals - Surface integrals - Volume Integrals - Green's theorem (excluding proof) :Applications in evaluating Line and Region - Gauss divergence theorem (excluding proof):Applications to cubes and parallelopipeds - Stoke's theorem (excluding proof):Applications to cubes and parallelopipeds.		
UNIT III	**ANALYTIC FUNCTION**	**9 + 3**
Definition of Analytic function – Cauchy Riemann equations- Properties of Analytic function - Determination of Analytic function using Milne's Thomson method-Conformal mapping (w=c+z, w=cz, w= $\frac{1}{z}$) - Bilinear transformation.		
UNIT IV	**COMPLEX INTEGRATION**	**9 + 3**
Cauchy's integral theorems (without proof) - Cauchy's integral formulae - Taylor's expansions with simple problems - Laurent's expansions with simple problems - Singularities - Poles and their types - Residues - Cauchy's residue theorem (without proof)- Contour integration: unit circle and semicircle.		
UNIT V	**LAPLACE TRANSFORMS**	**9 + 3**
Laplace Transforms of standard functions- Transforms properties- Transform of derivatives and integrals - Initial & Final value theorems (without proof) and Verification for some problems- Inverse laplace transforms using Partial fractions and Shifting theorem- Convolution theorem- Periodic functions- Solution of linear second order ODE equations with constant coefficients.		

Text Book (s)

1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008

Reference (s)

1	B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008
3	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
4	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002

Regulation 2018		Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM102T	VALUE EDUCATION	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Connect the learners to their potential, identify their potential to create a new positive world
CLR-2	Analyze the merits and demerits of different educational systems. Identify the different systems of education
CLR-3	Draw attention towards the weaknesses they are susceptible to and inspire them through positive models
CLR-4	Instill a sense of professional ethics which help them develop a safe comfortable and prosperous society
CLR-5	Cultivate a spirit of willing accommodation in an increasingly diverse world

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Equipped with an awareness of their positive energy and power
CO2	Identify the meaning of 'education'; have a clearer and better understanding in taking education to the masses
CO3	Assess their weaknesses; understand risks involved and rectify them through learning from positive and negative instances
CO4	Realize their professional responsibilities
CO5	Acquire the required values in an expanding pluralistic world not be swept off their feet due to the rapid changes

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	3	-	3	3	3	-	3	-	-	-
CO2	2	3	2	-	3	3	2	2	3	3	-	3	-	-	-
CO3	2	-	-	-	2	3	2	2	3	3	-	3	-	-	-
CO4	3	2	-	-	3	3	3	3	3	3	-	3	-	-	-
CO5	2	-	-	-	3	3	3	3	3	3	-	3	-	-	-
(Avg)	2	2.33	2	-	2.6	3	2.5	2.6	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	VISIONS FOR YOUTH	6
Introduction (Quiz) - Two speeches by great personalities (Oral presentations) - Quotes, proverbs relating to the power and potential of youth, Excerpts: Wings of Fire (Collecting proverbs highlighting the potential of youth) - Two news articles highlighting the initiatives for social causes by youth (Role play in a similar context) - One song exhibiting the positive energy of youth (Discussion on the song)		
UNIT II	**YOUTH AND EDUCATION**	**6**
Meaning and the significance of education (Brainstorming) - Overview of different (traditional, modern) educational systems (Debate) - Role of youth in education, Urban and Rural set up, dissemination (Student presentations) - Designing and framing educational curriculum and materials (Students' Presentation based on write ups) -The pressing challenges in current educational system (Collage Design)		
UNIT III	**YOUTH AND SOCIETY**	**6**
Need for social values in the present context (Poem – "Where the mind is without fear" , Write up on various instances from real life) - Individual and group behaviour, respect for others (Case study on recent happenings) - Civic sense, bullying-substance abuse, uses of expletives (Case study on recent happenings) - Hero worship, gender insensitivity moral policing (Case study on recent happenings) - Positive contribution by youth in promoting social welfare (Short videos followed by discussions)		
UNIT IV	**YOUTH AS PROFESSIONALS**	**6**
Introduction to professional values (Brainstorming through visual cues) - Engineering societies in India (Quiz) - Challenges to be addressed by Engineers in India (Case Study) - Challenges in different sectors: agriculture (Case Study) - Challenges in different sectors: urban development, environment (Group activity (oral and written)) - Challenges in different sectors: sustainable development, cyber security (Case Study – from Newspapers)		
UNIT V	**YOUTH IN PLURALISTIC SOCIETY**	**6**
Introduction to pluralistic society, forces of globalization (Group Discussion) - Science and technology intercultural proximity (Narration of stories from various religions to illustrate the oneness of humanity) - Positive, Negative impact: religion, politics, gender, economic status, aesthetics (Discussion on "To Kill a Mocking Bird") - Values required to live in a global society (Poster presentation on festivals of various religions) - Learning the etiquettes of various societies (Poster presentation on festivals of various religions) - Success of pluralistic society, enliven the society, religious harmony through literary (Writing the aspects of pluralistic society based on the text).		

Text Book (s)	
	Nil
Reference (s)	
1	Kalam, APJ Abdul. Wings of Fire: AN Autobiography of APJ Abdul Kalam. Ed. Sangam Books Ltd., 1999
2	"Banaras Hindu University Speech" and "To Students". The Voice of Truth. General Editor Shriman Narayan. Navajivan Publishing House. pp. 3-13 and pp. 425-30. www.mkgandhi.org
3	Piroda, Sam. "Challenges in Science and Technology". www.nfdindia.org/loc19.htm

4	Thomas A Address to VTU Students by Narayana Murthy. https://www.karnataka.com/personalities/narayana-murthy/vtu-address-2006/
5	World Economic forum. "India's top 7 challenges from skills to water scarcity"

Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB201T	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (Common to B.E Mech, EEE, Civil & EIE)	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Develop the skills of the students in the areas of Transforms and Partial differential Equations
2	Apply for the effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory.
3	Serve as a prerequisite for post graduate and specialized studies and research.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Expand a function in terms of Fourier Series and apply it for solving engineering problems.
CO2	Gain knowledge on Fourier Transforms
CO3	Model and solve higher order partial differential equations
CO4	Apply the methods of solving PDE in practical problems
CO5	Handle problems in Z transforms and apply it to solve difference equations

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	-
CO2	3	3	1	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO5	3	3	2	3	-	-	-	-	-	-	-	-	1	-
CO (Avg)	3	3	1.8	1.4	-	-	-	-	-	-	-	-	1.3	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FOURIER SERIES	9+3
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series — Parseval's identify – Harmonic Analysis.		
UNIT II	**FOURIER TRANSFORMS**	**9+3**
Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem– Parseval's identity.		
UNIT III	**PARTIAL DIFFERENTIAL EQUATIONS**	**9+3**
Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second order with constant coefficients.		
UNIT IV	**BOUNDARY VALUE PROBLEMS**	**9+3**
Classification of second order partial differential equations-Solutions of one dimensional wave equation – One dimensional equation of heat conduction –Solution of two dimensional equation of heat Equation in Cartesian coordinates.		
UNIT V	**Z - TRANSFORMS AND DIFFERENCE EQUATIONS**	**9+3**
Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z-transform.		

Text Book (s)

1	Grewal.B.S, *'Higher Engineering Mathematics'* 40th Edition, Khanna publishers, Delhi, (2007)

Reference (s)

1	Bali.N.P and Manish Goyal *'A Textbook of Engineering Mathematics'*, Seventh Edition, Laxmi Publications(P) Ltd. (2007)
2	Ramana.B.V. *'Higher Engineering Mathematics'* Tata Mc-GrawHill Publishing Company limited, New Delhi (2007).
3	Glyn James, '*Advanced Modern Engineering Mathematics'*, Third edition-Pearson Education (2007).
4	Erwin Kreyszig *'Advanced Engineering Mathematics'*, Eighth edition-Wiley India (2007).

Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
ESC	18CES201T	ENGINEERING MECHANICS	3	1	0	4

Prerequisite Course (s)

Physics

Course Objective (s): The purpose of learning this course is to:

1.	To introduce coplanar and space forces and the conditions for the equilibrium of particles
2.	To enhance the practical knowledge on Newton's second law of motion to the dynamics of particles
3.	To determine the stresses, strains and its relation in simple and compound systems and to analyze trusses for member forces
4.	To find the shear stress of various section and geometric properties
5.	To understand the concepts of Torsion and spring

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Recognize the various force systems and laws of mechanics
CO2	Apply the basic concepts of dynamics in Rectilinear motion
CO3	Compute simple stresses and strains and analyse of plane truss
CO4	Compute geometric properties of sections and Compute bending and shear stresses for various sections
CO5	Illustrate the torsional effect in shafts and springs

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	2	-	-	-	-	-	2	2	1
CO2	3	2	2	1	-	1	-	-	-	-	-	1	2	2
CO3	3	2	2	2	-	2	-	-	-	-	-	2	2	2
CO4	3	2	2	1	-	2	-	-	-	-	-	2	2	1
CO5	3	2	2	2	-	2	-	-	-	-	-	2	2	2
CO (Avg)	3.00	2.00	2.00	1.40	0.00	1.80	0.00	0.00	0.00	0.00	0.00	1.80	200	1.60

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO STATICS	9 + 3
Introduction - Units and dimensions - Laws of mechanics - Parallelogram law of forces - Vectors - Vectorial representation of forces -Coplanar forces - Resolution and composition of forces - Equilibrium of a particle under coplanar forces .		
UNIT II	**BASICS OF DYNAMICS**	**9+3**
Kinematics and kinetics – displacements, velocity and acceleration - Equations of motion – Rectilinear motion of a particle with uniform velocity, uniform acceleration, varying acceleration – motion curves – motion under gravity.		
UNIT III	**STRESSES AND STRAIN ,PLANE TRUSS**	**9 + 3**
Introduction, stress, strain, tensile, compressive and shear stress – Hooke's law – Relationship among Elastic constants – Stress Strain Diagram for Mild Steel, TOR Steel, Concrete – Principle of superposition - Bars of Varying sections – Compound Bars. PLANE TRUSSES: Analysis of Plane Trusses – Method of Joints.		
UNIT IV	**GEOMETRIC PROPERTIES OF SECTIONS**	**9 + 3**
Centroid and moment of inertia of plane areas and compound sections, parallel axes and perpendicular axis theorems. BENDING AND SHEAR STRESSES: Bending stresses ,shear stresses in various sections.		
UNIT V	**TORSION AND SPRING**	**9 + 3**
Torsion of Circular and Hollow Shaft - Elastic Theory of Torsion-Stress and Deflection in Shafts - Stepped Composite Shafts - Combined Bending Moment and Torsion on Shaft - Strain Energy due to Torsion - Helical Spring - Leaf Spring.		

Text Book (s)

1	Rajput. R.K., "Strength of Materials", S. Chand Publications, 2018
2	S.S. Bhavikatti and K.G.Rajasekarappa, "Engineering Mechanics", New Age International Pvt Ltd. 2015

Reference (s)

1	Timoshenko. S.P. and Young D.H., "Elements of Strength of Materials", 5th edition (SI Units), Affiliated East-West Press Ltd., New Delhi, 2012.
2	Bansal R K "Strength of Materials", Laxmi Publications, New Delhi, 2010
3	Ferdinand P. Beer and E. Russell Johnston Jr, "Mechanics of Materials", McGraw Hill Book Company, Singapore, 2014.
4	Jhunarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol. I, Charotar Publishing House, NewDelhi,2015.
5	Robert L.Mott, "Applied Strength of Materials", PHI Learning Pvt Ltd.," New Delhi, 2009

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Regulation 2018		Semester III	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC201J	FLUID MECHANICS AND HYDRAULIC MACHINERY	3	0	2	4

Prerequisite Course (s)

Physics

Course Objective (s): The purpose of learning this course is to:

1.	Learn the basic properties of fluids.
2.	Get knowledge about dimensional analysis and model laws.
3.	Know the types and characteristics of open channel flow.
4.	Describe the uniform, gradually and rapidly varied flows in steady state conditions and flow in pipes.
5.	Know the various types of turbines and pumps.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the properties of fluids and fundamental concept of fluid mechanics.
CO2	Understand the principle of model analysis and dimensional analysis by using various methods.
CO3	Apply their knowledge of fluid mechanics in addressing problems in open channels.
CO4	Solve problems in uniform, gradually and rapidly varied flows in steady state conditions and flow in pipes.
CO5	Apply principles of fluid mechanics to the operation, design, and selection of fluid machinery such as pumps and turbines.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	3	2	1	-	1	-	-	2	2	2
CO2	2	2	1	-	-	-	-	1	1	-	-	1	1	1
CO3	3	3	1	-	1	1	1	-	1	-	-	2	2	2
CO4	3	2	-	-	2	2	1	1	1	-	-	2	2	2
CO5	3	2	1	-	3	2	1	-	-	-	-	2	2	2
CO (Avg)	2.80	2.20	1.00	0.00	2.25	1.75	1.00	1.00	1.00	0.00	0.00	1.80	1.80	1.80

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	FLUID PROPERTIES AND FLUID STATICS	9
Fluid and fluid properties- Definition-Capillary rise and fall-Surface tension-Vapour pressure, Compressibility, Bulk modulus-Viscosity-Newton's law of viscosity- Pressure measuring instrument-Manometer and Gauges.		
UNIT II	**DIMENSIONAL ANALYSIS AND MODEL STUDIES**	**9**
Fundamental and derived units-Dimensional homogeneity and Similarity-Rayleigh's method-Buckingham π theorem method-Model and its type-Model Laws and scale effects.		
UNIT III	**OPEN CHANNEL FLOW**	**9**
Open Channel Flow- Definition- Types-Properties of open channel - Velocity Distribution in Open Channel flow- Uniform Flow – Manning's and Chezy's formulas –Determination of depth and velocity - Most Economical Sections (Trapezoidal channel) - Drawdown and backwater curves - Hydraulic jump .		
UNIT IV	**FLOW THROUGH PIPES**	**9**
Major and Minor losses- Flow through pipes in series and parallel-Equivalent pipe and pipe network - Measuring instruments - Venturimeter, Orificemeter- Derivation - Euler's & Bernoulli's equation - Applications of Bernoulli's equation.		
UNIT V	**HYDRAULIC TURBINES AND PUMPS**	**9**
Turbines-Classification – working principles and velocity triangle of Pelton wheel, Francis and Kaplan Turbines Pumps- working principle of -Rotodynamic Pump, Positive displacement Pump.		
	LIST OF EXPERIMENTS	**30**

1. Flow Through Venturimeter
2. Flow Through Orificemeter
3. Determination of Major And Minor Losses In Pipes
4. Characteristic of Centrifugal Pumps
5. Characteristics of Reciprocating Pumps
6. Characteristics of Submersible pump
7. Flow Through Notches
8. Characteristics of Pelton Wheel Turbine
9. Characteristics of Kaplan Turbine
10. Characteristics of Francis Turbine

Text Book (s)

1	R.K. Bansal, "Fluid Mechanics and Hydraulic Machines", Lakshmi publications, 2018, Delhi.
2	Modi P.N and Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Rajsons Publications Pvt. Ltd., Delhi.

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Reference (s)	
1	Roberson J.A and Crowe C.T., "Engineering Fluid Mechanics", Mumbai, Jaico Books, 2000.
2	Streeter, V.L.Wylie,E.B. and Bedford K.W, "Fluid Mechanics", 9th edition, New Delhi, TataMcGrawHill, 2017.
3	Jain A. K. "Fluid Mechanics". Khanna Publishers, 1998.
4	Fox W.R. and McDonald A.T., "Introduction to Fluid Mechanics", Singapore, John-Wiley and Sons, 2018.

Regulation 2018		Semester III	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC202T	CONSTRUCTION MATERIALS AND TECHNIQUES	3	0	0	3

Prerequisite Course (s)	
Basic Civil and Mechanical Engineering	
Course Objective (s): The purpose of learning this course is to:	
1	Summarize the knowledge of geology and its engineering considerations
2	Able to describe in details about rocks and its types
3	Acquire knowledge on commonly used construction materials
4	Obtain knowledge about various construction practices
5	Have exposure on sub-structure, super structure construction techniques
Course Outcome (s) (COs): At the end of this course, learners will be able to:	
CO1	Acquire the knowledge of the topographical formation, interior earth, gradational activities and weathering and also the theory of plate tectonics
CO2	Interpret minerals and rocks and assessment of its physical, mechanical and engineering properties.
CO3	Identify the appropriate materials used in construction
CO4	Sequence the various construction practices
CO5	Explore the sub structure and super structure construction techniques

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	2	3	2	-	-	-	1	1	2
CO2	3	1	1	-	-	2	3	2	-	-	-	1	1	2
CO3	2	1	2	1	-	2	-	3	-	2	-	2	3	3
CO4	3	1	2	1	-	2	-	3	-	2	-	2	3	3
CO5	2	1	2	2	-	2	-	3	-	2	-	2	3	3
CO (Avg)	2.60	1.00	1.60	1.33	0.00	2.00	3.00	2.60	0.00	2.00	0.00	1.60	2.20	2.60

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	ENGINEERING GEOLOGY	9
Geology in Civil engineering – branches of geology – scope – earth structures and composition – elementary knowledge on continental drift and plate technologies – earth processes – weathering – types – geological work of river and wind – engineering.considerations.		
UNIT II	**ROCKS AND BUILDING STONES**	**9**
Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks. Igneous rocks – Granite, Gabbro, Dolerite and Basalt. Sedimentary rocks – Sandstone, Limestone, Conglomerate and Breccia. Metamorphic rocks – Quartzite, Marble, Slate and Schist.		
UNIT III	**MATERIALS FOR CONSTRUCTION**	**9**
Timber – market form of timber – veneer – plywood – bricks – steel – TMT and GFRP bars – steel fibre – glass fibre – plastic – types of plastic – PVC – UPVC – paint – distemper – varnish		
UNIT IV	**CONSTRUCTION PRACTICES**	**9**
Stone masonry – brick masonry – load bearing wall – reinforced wall – framed structures – scaffolding and its types – basic of formwork – slip form work – centring – plastering – pointing.		
UNIT V	**CONSTRUCTION TECHNIQUES**	**9**
Sub structures: Trenchless techniques – box jacking – pipe jacking – tunnelling – sheet piling – piling techniques. Superstructures: Launching girders – Bridge decks – Shells – domes – Introduction to prefabricated structures.		

Text Book (s)	
1	Parbin Singh, "Engineering and General Geology", Taylor & Francis, 2009.
2	Arora S.P. and Bindra S.P., "The Text Book of Building Construction", Dhanpat Rai and Sons, 2010.
Reference (s)	
1	F.G. Bell "Engineering Geology", Elsevier, 2nd ed. 2007.
2	Edward Allen and Joseph Iano, "Fundamentals of Building Construction: Materials and Methods", Wiley, 5th Edition, 2008.
3	Rangwala S.C., "Engineering Materials" Charotar Publishing House, Anand, India, 2014.
4	Peurifoy. R. L, "Construction Planning, Equipment and Methods", McGraw Hill Co., New York, 2010.

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Regulation 2018		Semester III	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC203J	SURVEYING	3	0	2	4

Prerequisite Course (s)

Physics

Course Objective (s): The purpose of learning this course is to:

1	To study the different surveying equipments in the field of civil engineering
2	To enhance the ability to calculate surveying quantities.
3	To enable the suitability of surveying instruments and method to a given problem
4	To learn about the advanced methods of surveying to solve complex civil engineering problems.
5	To understand the principle of modern surveying instruments.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the basic classifications of surveying and to Compute the linear measurement in chain surveying.
CO2	Compute angular measurements in compass surveying and to prepare plan with plane table surveying.
CO3	Determine the Reduced levels of various points on ground and to compute the areas and volumes using levelling principles.
CO4	Determine the distance and heights of the object by using theodolite and to setting out curves by various methods.
CO5	To learn on the principles of Electronic distance measurements, Total station and GPS

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	3	1	-	-	-	-	-	2	2	2
CO2	3	3	2	-	3	2	-	-	-	2	-	2	3	2
CO3	3	3	2	-	3	2	-	-	-	2	-	2	3	2
CO4	3	3	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	-	-	3	1	-	-	-	-	-	3	3	3
CO (Avg)	3.00	2.80	2.00	0.00	3.00	1.50	0.00	0.00	0.00	2.00	0.00	2.2	2.6	2.2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO SURVEYING	9

Introduction: Definition, classification of surveys, Principles of surveying, Plan and map, Scale.

Chain surveying: Ranging and Chaining, survey station and survey lines, instruments used for setting out right angles, obstacles in chaining, Errors in chain survey.

UNIT II	COMPASS SURVEYING AND PLANE TABLE SURVEYING	9

Compass Surveying: Introduction, Bearing and angles, system of bearings, conversion of WCB to RB and vice versa, Prismatic compass, Magnetic declination, local attraction, Computation of compass traverse.

Plane Table Surveying: Accessories, working operations, methods of plane tabling-Radiation, Intersection, Traversing, Resection(Two point problem), Errors in plane table surveying.

UNIT III	LEVELLING	9

Levelling: Definitions, Levelling Instruments-Types of level and Level staff, temporary adjustments of a level, Benchmark and its types, methods of levelling - fly levelling - contouring.

Areas and Volumes: Calculation of areas and volumes by mid - ordinate, average ordinate, trapezoidal and Simpson's methods.

UNIT IV	THEODOLITE SURVEYING	9

Theodolite Survey: Types of theodolite, Parts of thedolite, Definitions, Measurement of horizontal and vertical angle, Tacheometric surveying - Stadia and tangential methods - setting out of simple curves.

UNIT V	MODERN METHODS OF SURVEYING	9

Electronic Distance Measurement (EDM) – Types - Principles - Total station, Global Positioning System (GPS) - segments of GPS, application of Total station and GPS.

LIST OF EXPERIMENTS	30

1. Aligning, Chaining and Ranging of a line
2. Determination of area of the boundary by traversing using chain (perpendicular offset)
3. Determination of included angles of a given boundary by traversing using compass
4. Locate the position of Plane table by radiation method.
5. Determine the reduced levels of the given points by Height of collimation
6. Determination of profile of the given area by Longitudinal and Cross sectioning in Levelling.
7. Measurement of horizontal angle by repetition method.
8. Measurement of vertical angles by using theodolite.
9. Determination of horizontal distance by Tangential method.
10. Mapping of College Campus using GPS.
11. Determination of Area by using Total station.
12. Foundation Marking

Text Book (s)	
1	Punmia,B.C, Ashok K Jain and Arun K Jain, " Surveying" Vol. I&II, Laxmi Publication, 16th Edition, New Delhi, 2005.
2	Kanetkar,T.P, and Kulkarni,S.V, "Surveying and Levelling" Vol.I&II, United Book Corporation, 23rd Edition, Pune,1997.
Reference (s)	
1	Duggal S.K, "Surveying, Vol. I & II", Tata McGraw-Hill, Publishing Company, 2004.
2	Arora,K.R, "Surveying Vol.I & II", Standard Book House Publishers & Distributors, New Delhi, 2008
3	Venkatramaiah C, "Textbook of Surveying", University Press, 2nd Edition, Hyderabad, 2011.
4	Chandra .A.M "Plane Surveying and Higher Surveying", Chennai, New Age International (P) Limited, Publishers, 2002.

Regulation 2018		Semester III	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC204J	ENVIRONMENTAL ENGINEERING I	3	0	2	4

Prerequisite Course (s)

Environmental Science

Course Objective (s): The purpose of learning this course is to:

1	To impart knowledge on the various issues pertaining to quantity of water.
2	To impart knowledge on hydrological cycle and various sources of water
3	To emphasize the quality of water and various system of conveyance of water
4	To learn about Principles and design of water treatment system
5	To emphasize the need for distribution systems and service reservoir

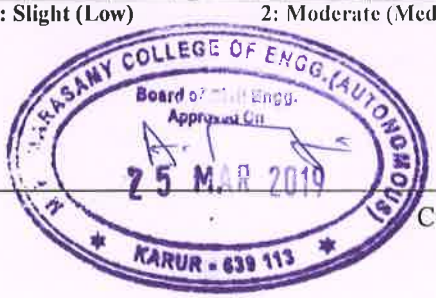
Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyze quantity of water and needs of public water supply schemes.
CO2	Identify the sources of water and evaluate the storage capacity of the reservoir.
CO3	Relate water quality criteria and standards to public health.
CO4	Construct appropriate treatment schemes to remove certain pollutants present in water
CO5	Design and evaluate water distribution alternatives on basis of chosen criteria.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	2	2	2	1	1	-	2	2	1
CO2	3	2	3	2	2	2	2	1	1	1	-	1	2	1
CO3	2	2	3	2	2	2	2	1	1	1	-	2	2	1
CO4	3	2	3	2	2	2	2	2	1	1	-	2	3	1
CO5	2	2	2	2	-	2	2	1	1	1	-	1	1	1
CO (Avg)	2.60	2.20	2.60	2.00	2.00	2.00	2.00	1.40	1.00	1.00	0.00	1.60	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	INTRODUCTION	9

Necessary and objectives of public water supply schemes – planning and financing – report preparation of schemes-quantity of water – water requirements for continuous and intermittent supply – rate of demand – variations in rate of demand – its effect on design –design periods and capacities of different components –population growth and forecast estimating the quantity of water required.

UNIT II	HYDROLOGICAL CONCEPTS AND SOURCES OF WATER	9

Hydrological concepts-hydrological cycle – precipitation – types of precipitation – rain fall measurements – rain fall indices –estimation of surface runoff – Sources of water –types of sources – wells – lakes – ponds – rivers – infiltration galleries - intakes – types – intake tower – storage reservoirs – determination of reservoir storage capacity by analytical and mass curve methods.

UNIT III	QUALITY OF WATER AND CONVEYANCE OF WATER	9

Characteristics of water - sampling –analysis of water – water borne diseases – water quality standards- conveyance of water – types of conduits – hydraulics of pipe flow – pipe corrosion – theories – effect and prevention – laying and testing of pipe lines - pumps – pumping stations.

UNIT IV	TREATMENT OF WATER	9

Treatment of water – working principles, purpose and design – screening – plain sedimentation – coagulation– filtration – disinfection – water softening – ion exchange- membrane processes.

UNIT V	DISTRIBUTION OF WATER AND IMPACT OF WATER SUPPLY SCHEMES	9

Distribution of water – requirements of good distribution system – method of distribution system – layouts of distribution system – distribution reservoirs – purpose – types– preventive methods to reduce wastage of water – impact of water supply schemes- 3R principles of water management.

LIST OF EXPERIMENTS	30

1. Sampling and preservation methods and significance of characterization of water and Wastewater.
2. Determination of pH and turbidity
3. Determination of hardness of water
4. Determination of dissolved oxygen
5. BOD Test
6. COD Test
7. Determination of ammonia nitrogen in water sample
8. Determination of nitrates in water sample
9. Determination of phosphate in water sample
10. Determination of potassium and sodium
11. Heavy metals determination – chromium, lead and zinc. (Demonstration only)

Text Book (s)	
1	Garg, S.K., "Environmental Engineering Vol. I", 24th Edition, New Delhi, Khanna Publishers, 2018.
2	Mark J. Hammer, Mark J. Hammer Jr, "Water and Waste Water Technology", Prenticehall new arrivals 2012.
Reference (s)	
1	"Manual on water supply and Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2	Qasim, S.R., Motley, E.M. and Zhu.G. "Water works Engineering – Planning, Design and Operation", Prentice Hall, New Delhi, 2002.
3	Birdie, G.S. and Birdie, J.S., "Water Supply and Sanitary Engineering", Dhanpat Rai and Sons, New Delhi, 2014.
4	Punmia, B.C., Jain, A.K., and Jain.A., "Environmental Engineering, Vol.I," Lakshmi Publications,2015.
5	Poonia, M.P.,Sharma, S.C., "Environmental Engineering",Khanna Publishers, 2018.

Regulation 2018		Semester III	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP103L	MINOR PROJECT I	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

Identify the suitable idea and methods to develop the project idea into demonstrative or to explain the concepts in standard procedure and to prepare report

Course Outcome (s) (COs): At the end of this course, learners will be able to:

Identify the requirement and develop the concepts or models through standard procedure and preparation of report

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	0	1	1	1	1	1	1	-	1	2	1
CO (Avg)	3.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a project report after completing the work to the satisfaction.
- The student will be evaluated through continuous assessment by a panel formed under the approval of head of the department

Regulation 2018		Semester III	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM201L	COMPETENCIES IN SOCIAL SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Sharpen problem solving skill and to improve thinking capability of the students
2	Hone soft skill and analytical ability of students
3	Engage learners in using language purposefully and cooperatively
4	Expertise the writing and presentation skill to fulfill the corporate expectations

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in an effective manner
CO2	Design and deliver information in a proper manner
CO3	Improve their presentation skills individually as well as a team member

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	-	2	-	-			
CO3	-	-	-	-	-	-	-	-	2	-	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	2.00	2.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Module - 1	6
Aptitude: Coding & Decoding - Direction Sense Test. **Communication:** Self-Introduction and SWOT analysis - Letter writing - types.		
UNIT II	**Module - 2**	**6**
Aptitude: Venn Diagrams - Data Interpretation. **Communication:** Phrasal verbs - Voice of Valluvar.		
UNIT III	**Module - 3**	**6**
Aptitude: Averages. **Communication:** Idioms and Phrases - Skits.		
UNIT IV	**Module - 4**	**6**
Aptitude: Time and Distance - Problems on Trains. **Communication:** Prefix/Suffix - Root words - Adjectives - JAM (Extempore Speech).		
UNIT V	**Module - 5**	**6**
Aptitude: Clocks & Calendars. **Communication:** Homophones - Frame Tales.		

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

Regulation 2018		Semester III / Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18CYM201T	ENVIRONMENTAL SCIENCE	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- To demonstrate in-depth knowledge within environmental engineering and an awareness of social, economic, political, and environmental impacts of engineering practices.
- To have competence for working with multi-disciplinary teams to arrive at solutions to environmental engineering problems.
- To get solutions which will minimize the negative impact of human activities on the environment and to protect human health

Course Outcome (s) (Cos):

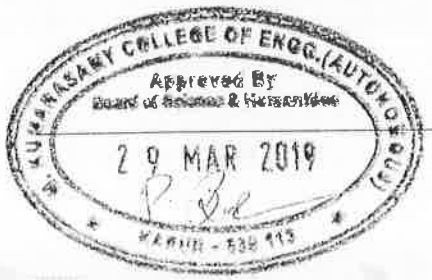
At the end of this course, learners will be able to:

CO1	Improve fundamental knowledge of the inter-relationships between the built environment and natural systems
CO2	Characterize and mitigate man-made hazards like nuclear hazards. Understand the principles involved in the generation of different forms of energy
CO3	Improve the reliability, performance, disaster-management of natural calamities and solid waste and water supplies and treatment processes.
CO4	Understand the source, effects and control measure of various environmental pollution
CO5	Apply information technology in the control of human population and women and child welfare

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	3	-	-	-	-	-	1	1
CO2	-	2	-	-	-	3	3	-	-	-	-	-	2	1
CO3	-	2	-	2	-	3	3	-	-	-	-	-	2	1
CO4	-	2	-	-	-	3	3	2	-	-	-	-	2	2
CO5	-	2	-	2	-	3	3	-	-	-	-	-	1	1
CO (Avg)	-	**2.00**	-	**2.00**	-	**3.00**	**3.00**	**2.00**	-	-	-	-	**1.60**	**1.20**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**



UNIT I	ENVIRONMENT& BIODIVERSITY	3
Definition-types of environment, components of environment, scope-importance of environmental studies- Bio diversity-definition-value of biodiversity-Threats to biodiversity - India a mega diversity nation-endangered and endemic species of India-conservation of biodiversity.		
UNIT II	ENERGY SOURCES	3
Energy resources- Growing energy needs- Renewable and Nonrenewable energy sources- Use of alternate energy sources - Nuclear Energy- Alternative energy fuels-power alcohol-Bio diesel (preparation, properties &uses)		
UNIT III	SOCIAL ISSUES AND ENVIRONMENT	3
Environment ethics – Climate change – Global warming – Acid rain – Ozone layer depletion –Nuclear accidents-holocaust. Solid waste management - Rain water Harvesting-watershed management-		
UNIT IV	ENVIRONMENTAL POLLUTION & ACTs	3
Source, types, effects & control- Air pollution -Water pollution – Soil pollution – Marine pollution and Plastic Pollution -The Environment (Protection) Act - Air (Prevention and control of pollution) Act - Water (Prevention and control of pollution) Act- Role of individual in prevention of pollution.		
UNIT V	HUMAN POPULATION AND ENVIRONMENT	3
Sustainable development – Urban Population growth and distribution – Population explosion – Family Welfare Program –Women and child welfare- Role of information technology in environment and human health- case studies		

Text / Reference (s) books:

1	Dr.J.P.Sharma, " Environmental studies" , Laxmi Publications(p) Ltd, New Delhi.
2	Miller "Environmental Science" 11th Edition, Cengage Learning India Private Limited, New Delhi, (2006).
3	Master. G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt Ltd., (2004)
4	Dr.A.Ravikrishnan " Environmental Science and Engineering " Sri Krishna publications, Chennai(2015)
5	P.Anandan, R.Kumaravelan "Environmental Science and Engineering" Scitech Publication (India) Pvt. Ltd, Chennai, Reprint 2009.

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Approved By
Board of Science & Humanities
29 MAR 2019
KARUR - 639 113

Regulation 2018		Semester III / Semester IV	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM103T	INDIAN TRADITION AND HERITAGE	1	0	0	-

Prerequisite Course (s)

Nil

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Make students understand the role and impact of culture in human life.
CLR-2	Draw attention towards languages and literatures of ancient period.
CLR-3	Cultivate secularism in students
CLR-4	Equip students with the knowledge of Indian art and architectural evolution over years.
CLR-5	Make students identify Indian culture in abroad

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Understand the meaning of culture, trace the influence and significance of geographical features on Indian culture.
CO2	Develop an awareness of the variety of languages and literatures in India
CO3	Recognise the characteristics of various religious movements in ancient India
CO4	Identify the characteristics and various styles of Indian architecture and sculpture at different times
CO5	Examine various modes through which Indian culture spread abroad

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	-
CO2	-	-	-	-	-	2	2	1	2	2	1	2	-	-
CO3	-	-	-	-	-	1	1	1	1	1	1	1	-	-
CO4	2	2	2	2	2	2	2	2	2	2	1	2	-	-
CO5	-	-	-	-	-	2	2	2	2	2	-	2	-	-
CO (Avg)	2	2	2	2	2	1.8	1.8	1.6	1.8	1.8	1	1.8	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	HISTORY OF INDIAN CULTURE	2
Characteristics of Indian Culture - Significance of Geography on Indian Culture -Society in India through ages- Ancient Period - Varna and Jati, family and marriage in India - Position of women in ancient India- Contemporary period; Caste system and communalism.		
UNIT II	LITERATURE AND EDUCATION	4
Evolution of script and languages in India : Harappan Script and Brahmi Script, Short History of the Sanskrit Literature: The Vedas, The Brahmanas and Upanishads and Sutras, Epics: Ramayana and Mahabharata&Puranas - History of Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, Sangam Literature and Odia Literature.		
UNIT III	RELIGION AND PHILOSOPHY	4
Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainisim, Indian Philosophy - Vedanta and Mimansa school of Philosophy.		
UNIT IV	ART AND ARCHITECTURE	2
Indian Art & Architecture: Gandhara School and Mathura School of Art; Hindu Temple Architecture, Budhhist Architecture, Medieval Architecture and Colonial Architecture, Indian Painting Tradition, Performing Arts: Divisions of Indian classical music: Hindustani and Carnatic, Dances of India, Rise of modern theatre and Indian cinema.		
UNIT V	SPREAD OF INDIAN CULTURE ABROAD	3
Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia, India, Central Asia and Western World through ages.		
Text Book (s)		
	Nil	
Reference (s)		
Chakravarti, Ranabir: Merchants, Merchandise & Merchantmen, in: Prakash, Om (ed.): *The Trading World of the Indian Ocean, 1500-1800* (*History of Science, Philosophy and Culturein Indian Civilization*, ed. by D.P. Chattopadhyaya, vol. III, 7), Pearson, Delhi, 2012.		

Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB204T	STATISTICS AND NUMERICAL METHODS (Common to B.E Mech, EEE, Civil & EIE)	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Know the various methods of solving algebraic and transcendental equations numerically where analytical methods fail to give solution
2	Understand the concept of interpolation
3	Understand the concept of numerical differentiation and integration which is widely applicable when the function in the analytic form is too complicated or the huge amount of data are given such as series of measurements, observation or some other empirical information

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Analyze and evaluate the accuracy of common numerical methods.
CO2	Apply numerical methods to obtain approximate solutions to mathematical problems.
CO3	Predict the solution of a given problem and confirm it with its corrector value and if it deviates to apply the corrector again.
CO4	Understand the problems of Students t-test for single mean and difference of means.
CO5	Identify the applications, various design and concepts of experiments.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO5	3	3	1	1	-	-	-	-	-	-	-	-	1	-
CO (Avg)	3	3	1.8	1.4	-	-	-	-	-	-	-	-	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS	9+3
Newton-Raphson method- Gauss Elimination method – Pivoting - Gauss-Jordan method – Iterative methods of Gauss-Jacobi and Gauss-Seidel - Matrix Inversion by Gauss-Jordan method - Eigenvalues of a matrix by Power method .		
UNIT II	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION**	**9+3**
Lagrange's and Newton's divided difference interpolation –Newton's forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule (Single Integral)		
UNIT III	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	**9+3**
Taylor's series method – Euler's method - Modified Euler's method - Fourth order Runge- Kutta method for solving first and second order differential equations – Milne's predictor-corrector methods and Adam Bash Forth predictor-corrector method for solving first order equations - Finite difference methods for solving second order equation.		
UNIT IV	**TESTING OF HYPOTHESIS**	**9+3**
Sampling distributions - Tests for Single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-square test for goodness of fit – Independence of attributes.		
UNIT V	**DESIGN OF EXPERIMENTS**	**9+3**
Completely randomized design – Randomized block design – Latin square design - 2^2 - factorial design.		

Text Book (s)	
1	R.A. Johnson and C.B. Gupta, "Miller and Freund"s Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2007.
2	Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", Khanna Publishers, New Delhi, 2004.
Reference (s)	
1	R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 8th edition, 2007.
2	M.R. Spiegel, J. Schiller and R.A. Srinivasan, "Schaum"s Outlines Probability and Statistics", Tata McGraw Hill edition, 2004.
3	Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 5th Edition, Tata McGraw-Hill, New Delhi, 2007.

Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
ESC	18CES202L	COMPUTER AIDED CIVIL ENGINEERING DRAWING	0	0	4	2

Prerequisite Course (s)

Basic Civil and Mechanical Engineering, Engineering Graphics

Course Objective (s): The purpose of learning this course is to:

1. Understand the building bye-laws and NBC requirements.
2. Understand the need for approval and introduction to drafting in Auto Cad

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Apply building bye-laws and NBC requirements in planning a building.
CO2	Prepare a plan suitable for approval by any regulatory body using Auto Cad

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	3	2	3	2	2	-	3	3	3
CO2	3	2	1	-	3	3	2	3	2	2	-	3	3	3
CO (Avg)	3.00	2.00	1.00	-	3.00	3.00	2.00	3.00	2.00	2.00	-	3.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

LIST OF EXPERIMENTS	60

1. Introduction building bye-laws
2. Drawing of signs and symbols
3. Planning of residential buildings with RCC flat roof.
4. Planning of residential building with pitched roof.
5. Framed structure – Planning of primary school building
6. Industrial building with steel roof truss.
7. Approval plan of Single storey Residential building – plan, elevation and cross section.
8. Approval plan of Multi storied Residential building – plan, elevation and cross section.
9. Planning of Commercial building
10. Planning of IT Park

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Reference (s)	
1	National Building Code 2016
2	Shah.M.G., Kale. C.M. and Patki. S.Y., "Building Drawing with an Integrated Approach to Built Environment", Tata McGraw Hill Publishers Limited, 2004.
3	Marimuthu V.M., Murugesan R. and Padmini S., "Civil Engineering Drawing-I", Pratheeba Publishers, 2008.
4	A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley and Sons. Inc., 2008.
5	Sikka V. B., "A Course in Civil Engineering Drawing", 4th Edition, S.K. Kataria and Sons, 1998.

Regulation 2018		Semester IV	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC205J	STRENGTH OF MATERIALS	3	0	2	4

Prerequisite Course (s)

Engineering Mechanics

Course Objective (s): The purpose of learning this course is to:

1	To study the different methods of finding deflection of statically determinate beam and to draw the shear force, bending moment diagrams.
2	To analyse the Indeterminate beams and to draw the shear force, bending moment diagrams.
3	To analyze the column with different end conditions
4	To study about the unsymmetrical bending.
5	To understand the concepts of plane stresses, thick and thin cylinders and understand the behaviour of materials under various loading conditions.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	To impart knowledge on behaviour of structural elements subjected to transverse load
CO2	To recognize the behaviour of statically indeterminate beams.
CO3	To learn about the behavior of columns
CO4	To develop the concepts of unsymmetrical bending of beams and shear centre
CO5	To learn the concepts of stress in thick and thin cylinder and plane stresses
CO6	To able to obtain the material strength and stiffness properties of structural elements

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	2	2	1	1	1	-	-	2	3	3
CO2	2	2	2	-	-	2	1	2	1	-	-	2	2	3
CO3	2	2	2	-	-	-	1	3	1	-	-	2	3	3
CO4	3	3	2	-	-	3	-	2	-	-	-	1	1	2
CO5	3	3	2	-	-	3	-	3	1	-	-	2	1	2
CO6	1	1	1	1	2	2	1	1	1	-	-	2	2	2
CO (Avg)	2.33	2.33	1.83	1.00	2.00	2.40	1.00	2.00	1.00	0.00	0.00	1.83	2.00	2.50

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	STATICALLY DETERMINATE STRUCTURES	9
Introduction, types of beams –Types of loads – concentrated load, uniformly distribute load, uniformly varying load and couples. Shear force and bending moment diagram for statically determinate beams (cantilever, simply supported and over hanging with PL, UDL)- Deflection Curve –Double Integration Method – Macaulay's Method		
UNIT II	**STATICALLY INDETERMINATE STRUCTURES**	**9**
Propped Cantilever Beams – Fixed Beams – Continuous Beams – Theorem of Three Moments – Calculation of reactions, Bending Moments and Shear Force – Shear Force and Bending Moment Diagrams (for Concentrated Load and UDL).		
UNIT III	**THEORY OF COLUMNS**	**9**
Members Subjected to Axial Load – eccentric load – Slenderness Ratio – End Conditions – Buckling Load for Columns- Euler's Theory – Assumptions and Limitations – Rankine - Gordon Formula.		
UNIT IV	**UNSYMMETRICAL BENDING AND SHEAR CENTRE**	**9**
Unsymmetrical Bending – Product of Inertia – Stresses due to Unsymmetrical Bending – Deflection of beams due to Unsymmetrical Bending – Shear Centre – Definition – Shear Centre for Symmetrical and Unsymmetrical Sections.		
UNIT V	**PRINCIPAL PLANE ANDCYLINDERS**	**9**
PRINCIPAL PLANE: Analysis of plane stress and strain, principal stresses and strains THICK & THIN CYLINDER: Stresses and deformation of Thin cylindrical and spherical shells – Wire Wound Cylinders - Thick cylinder - Lame's theorem - Stress distribution - Compound cylinders.		
LIST OF EXPERIMENTS		**30**
1. Tension test on mild steel rod 2. Torsion test on mild steel bar 3. Tension and compression test on springs 4. Compression test on bricks and concrete cubes 5. Hardness test on different metals (Brinell and Rockwell) 6. Deflection test on simply supported beams (for different metals) 7. Charpy and Izod Impact Test 8. Double shear test (for different metals) 9. Compression and bending test on wood specimens		

Text Book (s)	
1	Rajput.R.K, "Strength of Materials", S. Chand & Co., New Delhi, 2014
2	Sadhu Singh, "Strength of Materials", Khanna publishers, New Delhi, 2013.

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3	Vaidyanathan.R, Perumal.P and Lingeswari.S, "Mechanics of Solids and Structures", Volume I", Scitech Publications Pvt Ltd, Chennai, 2006.
Reference (s)	
1	Prasad.I.B, "Strength of Materials", Khanna Publishers, New Delhi, 1998
2	James .M. Gere "Mechanics of Materials", Thomson India, Brooks/Cole, 2006
3	Kazimi, "Solid Mechanics", Tata McGraw Hill, 1998.
4	Bansal R K "Strength of materials", Laxmi Publications, New Delhi, 2010

Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC206T	CONCRETE TECHNOLOGY	3	0	0	3

Prerequisite Course (s)

Construction Materials and Techniques

Course Objective (s): The purpose of learning this course is to:

1	To Understand on properties of materials required for concrete
2	Know the Concepts of various Chemical and Mineral admixtures
3	Ability to perform concrete mix design
4	Types of concrete and their manufacture and tests are covered in this course.
5	Ability to get the experience of advancement in concrete research area

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify Quality Control tests on concrete making materials
CO2	Know the Concepts of various Chemical and Mineral admixtures
CO3	Design the concrete mix as per IS Method
CO4	Understand the behavior of fresh and hardened concrete
CO5	Understand the need for special concretes

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	2	1	1	-	1	-	3	2	2
CO2	3	2	-	-	-	3	1	-	-	-	-	2	2	2
CO3	3	2	3	2	-	3	2	1	1	-	-	3	3	2
CO4	3	2	-	-	-	2	1	-	-	-	-	3	2	2
CO5	3	2	-	-	-	2	1	-	-	-	-	1	1	2
CO (Avg)	3.00	2.00	3.00	2.00	0.00	2.40	1.20	1.00	1.00	1.00	0.00	2.40	2.00	2.00

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	CONSTITUENT MATERIALS	9
Cement –Manufacturing of Cement – Types and grades of Cements – Chemical composition and Properties – Hydration of cement – Tests on cement – Aggregates – Classification -Mechanical properties and tests as per BIS – Water – Quality of water for use in concrete –IS Specifications		
UNIT II	**ADMIXTURES**	**9**
Admixtures – Accelerators – Retarders – Plasticizers – Super plasticizers – Water proofers – Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline – Effects on concrete properties.		
UNIT III	**MIX DESIGN**	**9**
Principles of Mix Proportioning – Factors in the choice of mix proportions – Physical properties of materials required for Mix Design – Water/Cement ratio – Design Mix and Nominal Mix – Methods of Mix Design – BIS Method.		
UNIT IV	**PROPERTIES OF CONCRETE**	**9**
Manufacture of concrete – Workability – Testing of fresh Concrete – Segregation and Bleeding – Different Curing methods – Testing of Hardened concrete: Compressive Strength, Split tensile strength, flexural strength – Non-destructive testing methods: Rebound hammer method, Pull out test method, Ultrasonic pulse velocity method.		
UNIT V	**SPECIAL CONCRETES**	**9**
Light weight concretes – Self compacting concrete – Vacuum concrete – High strength concrete – High performance concrete – Fibre reinforced concrete –Ferrocement – Ready mix concrete – SIFCON – Geopolymer Concrete.		

Text Book (s)	
1	M. S. Shetty, "Concrete Technology" S. Chand & Company Ltd., New Delhi 2017.
2	Gupta B.B., Amit Gupta, "Concrete Technology" Jain book Agency,2010.
Reference (s)	
1	A. M. Neville "Properties of Concrete" Pitman 5th edition Education ltd 2016.
2	M.L. Gambhir "Concrete Technology" – Tata Mc. Graw Hill Publishers, New Delhi,2009
3	Santhakumar,A.R "Concrete Technology" , Oxford University Press, New Delhi,2007
4	IS10262-2019 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 2019

Regulation 2018		Semester IV	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC207J	SOIL MECHANICS	3	0	2	4

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

CO1	To impart knowledge on soil properties relevant to Civil Engineering and their determination
CO2	Understand the physical significance of effective stress and its relation with pore pressure
CO3	Understand how stresses are transferred through soils and be able to compute both geostatic and induced stresses due to point, line, and area loads.
CO4	To impart knowledge on estimation of the amount of consolidation and settlement
CO5	Computation of shear strength parameters and differentiate various modes of slope failure

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify the types of soil and expected behavior on application of load
CO2	Determine the permeability of soil, estimate soil stresses and prepare flow net diagram.
CO3	Estimate the stresses and displacement in soil mass due to various type of surface loading
CO4	Estimate the total settlement and time rate of settlement of the soil.
CO5	Analyze shear properties of cohesive and cohesion less soils and Analyze the slope failure

CO-PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	3	1	1	-	1	1	-	1	3	1
CO2	3	2	2	-	2	1	1	-	1	1	-	1	3	1
CO3	2	2	2	-	-	1	1	-	1	1	-	1	3	1
CO4	3	2	2	-	2	1	1	-	1	1	-	1	3	1
CO5	2	2	2	-	2	1	1	-	1	1	-	1	3	1
CO (Avg)	2.60	2.00	2.00	0.00	2.25	1.00	1.00	0.00	1.00	1.00	0.00	1.00	3.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	PHYSICAL PROPERTIES AND CLASSIFICATION OF SOIL	9

Soil formation – Soil problems in Engineering – Physical properties of soil – Phase relations – Index properties of soil –Grain size distribution – Atterberg's limits – Identification and classification of soils (BIS classification).

UNIT II	PERMEABILITY AND SEEPAGE IN SOILS	9

Soil water - concept of total, neutral and effective stresses - capillary phenomena - Permeability and its determination methods - permeability of stratified soils - Seepage flow - one dimensional flow - flow net - Determination of seepage quantity, quick sand condition

UNIT III	STRESS DISTRIBUTION	9

Vertical stress distribution in soil - Influence factors, Isobars, Boussinesq's equation, Westergaard's equation and Newmark's Influence Chart – Stress below equivalent point load. Contact pressure under rigid and flexible area.

UNIT IV	COMPACTION AND CONSOLIDATION	9

COMPACTION

Compaction – Laboratory test – Standard proctor's compaction – Modified proctor's compaction – Factors affecting compaction – Field compaction methods – Compaction control;

CONSOLIDATION

Consolidation – Immediate, primary and secondary consolidation,consolidation test - interpretation of consolidation test results, Terzaghi's theory of consolidation, pressure void ratio relationship, pre-consolidation pressure - Total settlement; co-efficient of consolidation – Curve fitting methods, rate of settlement

UNIT V	SHEAR STRENGTH AND SLOPE STABILITY	9

SHEAR STRENGTH

Shear strength - failure criterion- shear strength tests - direct shear test, UCC, Vane shear test and tri axial test - Different drainage conditions- Shear properties of cohesive and cohesion less soils - Mohr's Stress circle;

SLOPE STABILITY

Slope failure mechanisms - finite slopes and infinite slopes - Swedish circle method - Friction circle method (Theory only).

LIST OF EXPERIMENTS	30

1. Specific gravity of soil solids
2. Grain size distribution – Sieve analysis & Hydrometer analysis
3. Liquid limit, Plastic limit, Shrinkage limit tests
4. Field density Test (Sand replacement method and Core cutter method)

5. Determination of moisture – density relationship using standard Proctor compaction test. 6. Permeability determination (constant head and falling head methods) 7. Direct shear test in cohesion-less soil- Demonstration only 8. Unconfined compression in cohesive soil - Demonstration only 9. One dimensional consolidation test(Determination of co-efficient of consolidation – Demonstration only)	
Text Book (s)	
1	Punmia P.C, "Soil Mechanics and Foundations", Laximi Publications Pvt. Ltd, New Delhi, 2017.
2	Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2014.
Reference (s)	
1	Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2011.
2	McCarthy, D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", 6th Edition, Prentice Hall of India, 2002.
3	Karl Terzaghi, Ralph B. Peck, and Gholamreza Mesri ,"Soil Mechanics in Engineering Practice", 3rd Edition, John Wiley & Sons, 1996
4	Gopal Ranjan and Rao A.S.R., "Basic and Applied Soil Mechanics", New Age International Publishers, 2000

Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC208T	ENVIRONMENTAL ENGINEERING II	3	0	0	3

Prerequisite Course (s)

Environmental Engineering I

Course Objective (s): The purpose of learning this course is to:

1	To impart knowledge on the various issues pertaining to quantity of waste water.
2	To impart knowledge on characteristics of wastewater.
3	To emphasize the principles and design of wastewater treatment system.
4	To learn about principles and design of sludge management system.
5	To emphasize the need for secure wastewater disposal systems and reuse of used water.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyze quantity of wastewater and needs of sewerage system.
CO2	Identify the characteristics of wastewater and design the primary treatment units of wastewater.
CO3	Construct appropriate treatment schemes to remove certain pollutants present in wastewater
CO4	Adapt the suitable mode of disposal for the residual without endangering the environment.
CO5	Design and evaluate wastewater disposal alternatives on basis of chosen criteria.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	2	2	2	1	1	1	2	2	1
CO2	3	3	3	2	-	2	2	1	1	1	1	1	2	1
CO3	3	3	3	2	-	2	2	1	1	1	1	2	2	1
CO4	3	2	3	1	-	2	3	2	1	1	1	2	3	1
CO5	3	2	2	1	-	3	3	1	1	1	1	1	1	1
CO (Avg)	3.00	2.60	2.60	1.6	0.00	2.20	2.40	1.40	1.00	1.00	1.00	1.60	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PLANNING AND DESIGN OF SEWERAGE SYSTEM	9
Definition – classification – systems of sewerage – quantity of sewage – fluctuation in flow pattern – estimation and storm runoff – design flow for separate and combined system – hydraulics of sewers - self cleansing velocities – full flow / partial flow conditions – sewer sections – material for sewers – sewer joints – jointing materials – sewer laying under various conditions – test on sewers – sewer maintenance – sewer appurtenances – sewage pumping – types of pumps.		
UNIT II	**CHARACTERISTICS ANDPRIMARY TREATMENT OF WASTEWATER**	**9**
Characteristics and composition of sewage – physical and chemical analysis – DO and BOD and their significances – cycles of decomposition – fundamentals of microbiology of wastewater – primary treatment – screens –principles of grit chambers – principles, types of sedimentation – design of sedimentation tanks – septic tanks and effluent disposal systems.		
UNIT III	**BIOLOGICAL TREATMENT OF WASTEWATER**	**9**
Basic principles of biological treatment – activated sludge process – recirculation – diffuser – mechanical aeration – process modification – oxidation ditch – trickling filter – principles – NRC equation–principles of rotating biological contactor (RBC)– principles of sequencing batch reactor(SBR) – principles of membrane bioreactor – principles of UASB.		
UNIT IV	**SLUDGE MANAGEMENT AND HOUSE DRAINAGE**	**9**
Objectives of sludge treatment – properties and characteristics of sludge – sludge thickening – sludge digestion – drying beds – conditioning and dewatering – sludge disposal – sanitary fixtures and fitting – pipe system – general layout of house drainage.		
UNIT V	**SEWAGE DISPOSAL**	**9**
Methods – dilution – self-purification of streams – oxygen sag curve – wastewater reclamation techniques – land disposal – sewage farming - deep well injection – eutrophication – recycle and reuse of wastewater.		

Text Book (s)

1	Garg, S.K., "Environmental Engineering Vol. II", 24th Edition, New Delhi, Khanna Publishers, 2018
2	Punmia, B.C., Jain, A.K., and Jain.A., "Environmental Engineering, Vol.II", Lakshmi Publications, 2015.

Reference (s)

1	Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi, 2014.
2	Poonia, M.P.,Sharma, S.C., "Environmental Engineering",Khanna Publishers, 2018.
3	Mark J. Hammer, Mark J. Hammer Jr, "Water and Waste Water Technology", Prenticehall new arrivals 2012.
4	Birdie, G.S. and Birdie, J.S., "Water Supply and Sanitary Engineering", DhanpatRai and Sons, New Delhi, 2014.

Regulation 2018		Semester IV	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP104L	MINOR PROJECT II	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

Identify the suitable idea and methods to develop the project idea into demonstrative or to explain the concepts in standard procedure and to prepare report

Course Outcome (s) (COs): At the end of this course, learners will be able to:

Identify the requirement and develop the concepts or models through standard procedure and preparation of report

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	2	1	1	1	1	-	1	2	1
CO (Avg)	3.00	2.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a project report after completing the work to the satisfaction.
- The student will be evaluated through continuous assessment by a panel formed under the approval of head of the department

Regulation 2018		Semester IV	Total Hours			30
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18MBM202L	CRITICAL AND CREATIVE THINKING SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Focus on listening, speaking, & writing skills through audio & video sessions
2	Hone soft skill and analytical ability of students
3	Overcome the fear in group communication and to provide the effective communication
4	Expertise intelligible pronunciation, stress and intonation patterns

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in an effective manner
CO2	Demonstrate an ability to design and deliver messages
CO3	Improve their communication with practical experience

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	-	2	-	-			
CO3	-	-	-	-	-	-	-	-	-	2	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	-	2.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Module - 1	6
Aptitude: Time and Work - Pipes and Cisterns. **Communication:** Sentence Pattern - Debate.		
UNIT II	**Module - 2**	**6**
Aptitude: Boats and Streams. **Communication:** Tenses and voices - Tech Talk.		
UNIT III	**Module - 3**	**6**
Aptitude: Problems on Ages - Probability **Communication:** Analogies - Biography.		
UNIT IV	**Module - 4**	**6**
Aptitude: Data sufficiency - Logical Puzzles. **Communication:** Punctuation - Connection.		
UNIT V	**Module - 5**	**6**
Aptitude: Mensuration. **Communication:** Preposition - News of the Week.		

Text Book (s)	
1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

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Board of Information Technology On
25 MAR 2019
KARUR-639 113.

Regulation 2018		Semester III / Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18CYM201T	ENVIRONMENTAL SCIENCE	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- To demonstrate in-depth knowledge within environmental engineering and an awareness of social, economic, political, and environmental impacts of engineering practices.
- To have competence for working with multi-disciplinary teams to arrive at solutions to environmental engineering problems.
- To get solutions which will minimize the negative impact of human activities on the environment and to protect human health

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Improve fundamental knowledge of the inter-relationships between the built environment and natural systems
CO2	Characterize and mitigate man-made hazards like nuclear hazards. Understand the principles involved in the generation of different forms of energy
CO3	Improve the reliability, performance, disaster-management of natural calamities and solid waste and water supplies and treatment processes.
CO4	Understand the source, effects and control measure of various environmental pollution
CO5	Apply information technology in the control of human population and women and child welfare

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	3	-	-	-	-	-	1	1
CO2	-	2	-	-	-	3	3	-	-	-	-	-	2	1
CO3	-	2	-	2	-	3	3	-	-	-	-	-	2	1
CO4	-	2	-	-	-	3	3	2	-	-	-	-	2	2
CO5	-	2	-	2	-	3	3	-	-	-	-	-	1	1
CO (Avg)	-	2.00	-	2.00	-	3.00	3.00	2.00	-	-	-	-	1.60	1.20

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	ENVIRONMENT& BIODIVERSITY	3
Definition-types of environment, components of environment, scope-importance of environmental studies- Bio diversity-definition-value of biodiversity-Threats to biodiversity - India a mega diversity nation-endangered and endemic species of India-conservation of biodiversity.		
UNIT II	ENERGY SOURCES	3
Energy resources- Growing energy needs- Renewable and Nonrenewable energy sources- Use of alternate energy sources - Nuclear Energy- Alternative energy fuels-power alcohol-Bio diesel (preparation, properties &uses)		
UNIT III	SOCIAL ISSUES AND ENVIRONMENT	3
Environment ethics – Climate change – Global warming – Acid rain – Ozone layer depletion –Nuclear accidents-holocaust. Solid waste management - Rain water Harvesting-watershed management-		
UNIT IV	ENVIRONMENTAL POLLUTION & ACTs	3
Source, types, effects & control- Air pollution -Water pollution – Soil pollution – Marine pollution and Plastic Pollution -The Environment (Protection) Act - Air (Prevention and control of pollution) Act - Water (Prevention and control of pollution) Act- Role of individual in prevention of pollution.		
UNIT V	HUMAN POPULATION AND ENVIRONMENT	3
Sustainable development – Urban Population growth and distribution – Population explosion – Family Welfare Program –Women and child welfare- Role of information technology in environment and human health- case studies		

Text / Reference (s) books:

1	Dr.J.P.Sharma, " Environmental studies" , Laxmi Publications(p) Ltd, New Delhi.
2	Miller "Environmental Science" 11th Edition, Cengage Learning India Private Limited, New Delhi, (2006).
3	Master. G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt Ltd., (2004)
4	Dr.A.Ravikrishnan " Environmental Science and Engineering " Sri Krishna publications, Chennai(2015)
5	P.Anandan, R.Kumaravelan "Environmental Science and Engineering" Scitech Publication (India) Pvt. Ltd, Chennai, Reprint 2009.

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Board of Science & Humanities
29 MAR 2019
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Regulation 2018		Semester III / Semester IV	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM103T	INDIAN TRADITION AND HERITAGE	1	0	0	-

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Make students understand the role and impact of culture in human life.
CLR-2	Draw attention towards languages and literatures of ancient period.
CLR-3	Cultivate secularism in students
CLR-4	Equip students with the knowledge of Indian art and architectural evolution over years.
CLR-5	Make students identify Indian culture in abroad

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Understand the meaning of culture, trace the influence and significance of geographical features on Indian culture.
CO2	Develop an awareness of the variety of languages and literatures in India
CO3	Recognise the characteristics of various religious movements in ancient India
CO4	Identify the characteristics and various styles of Indian architecture and sculpture at different times
CO5	Examine various modes through which Indian culture spread abroad

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	-
CO2	-	-	-	-	-	2	2	1	2	2	1	2	-	-
CO3	-	-	-	-	-	1	1	1	1	1	1	1	-	-
CO4	2	2	2	2	2	2	2	2	2	2	1	2	-	-
CO5	-	-	-	-	-	2	2	2	2	2	-	2	-	-
CO (Avg)	2	2	2	2	2	1.8	1.8	1.6	1.8	1.8	1	1.8	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	HISTORY OF INDIAN CULTURE	2
Characteristics of Indian Culture : Significance of Geography on Indian Culture -Society in India through ages- Ancient Period - Varna and Jati, family and marriage in India - Position of women in ancient India- Contemporary period; Caste system and communalism.		
UNIT II	LITERATURE AND EDUCATION	4
Evolution of script and languages in India : Harappan Script and Brahmi Script, Short History of the Sanskrit Literature: The Vedas, The Brahmanas and Upanishads and Sutras, Epics: Ramayana and Mahabharata&Puranas - History of Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, Sangam Literature and Odia Literature.		
UNIT III	RELIGION AND PHILOSOPHY	4
Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainisim, Indian Philosophy - Vedanta and Mimansa school of Philosophy.		
UNIT IV	ART AND ARCHITECTURE	2
Indian Art & Architecture: Gandhara School and Mathura School of Art; Hindu Temple Architecture, Budhhist Architecture, Medieval Architecture and Colonial Architecture, Indian Painting Tradition, Performing Arts: Divisions of Indian classical music: Hindustani and Carnatic, Dances of India, Rise of modern theatre and Indian cinema.		
UNIT V	SPREAD OF INDIAN CULTURE ABROAD	3
Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia, India, Central Asia and Western World through ages.		
Text Book (s)		
	Nil	
Reference (s)		
Chakravarti, Ranabir: Merchants, Merchandise & Merchantmen, in: Prakash, Om (ed.): *The Trading World of the Indian Ocean, 1500-1800* (*History of Science, Philosophy and Culturein Indian Civilization*, ed. by D.P. Chattopadhyaya, vol. III, 7), Pearson, Delhi, 2012.		

Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC301T	ANALYSIS OF STRUCTURES	3	1	0	4

Prerequisite Course (s)

Engineering Mechanics, Strength of Material

Course Objective (s): The purpose of learning this course is to:

1	Analyse the indeterminate structures for internal forces by moment Distribution method and slope deflection method.
2	Analyse and solve parabolic and circular arched structures.
3	Formulate the element stiffness matrix and assemble the structure stiffness matrix for solving indeterminate problems.
4	Have knowledge on influence lines for statically determinate structures.
5	Introduce the importance of plastic analysis to calculate the collapse loads for beams and frames.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyse Indeterminate Structures using Moment Distribution Method and Slope Deflection Method.
CO2	Analyse the Arches under External Loads, Temperature Effects.
CO3	Analyse Structures using Stiffness Matrix Method.
CO4	Analyse Indeterminate Beams with Moving Loads.
CO5	Perform Plastic Analysis for Indeterminate Beams and Frames

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	SLOPE DEFLECTION AND MOMENT DISTRIBUTION METHOD	9+3

Degree of static and kinematic indeterminacy: Analysis of continuous beams – Sinking of Supports – Slope Deflection Method –Carry over factor – Distribution factor – Analysis of Continuous Beams – Analysis of single storey and single bay rectangular vertical frames without sway – Moment Distribution Method.

UNIT II	ARCHES	9+3

Arches as structural forms – Examples of arch structures –Types of arches – Analysis of three hinged and two hinged parabolic and circular arches–temperature effects.

UNIT III	MATRIX STIFFNESS METHOD	9+3

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacement vectors – Analysis of pin-jointed plane frames, continuous beams and rigid frames.

UNIT IV	MOVING LOADS AND INFLUENCE LINES	9+3

Introduction – Moving loads for statically determinate structures – construction of lines for reaction, SF and BM for rolling loads for simply supported and overhanging beams – computation of load positions for maximum bending moment and maximum shear force – absolute maximum bending moment– Muller Breslau's Principle – Construction of ILD for continuous beams.

UNIT V	PLASTIC ANALYSIS OF STRUCTURES	9+3

Plastic moment of resistance – Plastic Modulus – Shape factor – Load factor – Plastic Hinge and mechanism – Analysis of indeterminate beams and frames mechanism method.

Text Book (s)

1	Vaidyanadhan.R and Perumal.P, "Comprehensive Structural Analysis – Vol. I and Vol. II", Laxmi Publications, New Delhi, 2010
2	Bhavikatti S S, Structural Analysis Vol-1and 2, Vikas publishing House, PVT, LTD., 2013
3	Reddy C.S., –Basic Structural Analysis‖, Tata McGraw Hill Publishing Co., 2011.

Reference (s)

1	Ramamurtham.S– Theory of structures, Dhanpat Raiand Sons, New Delhi, 2014.
2	Dr.B.C.Punmia, Er.Ashok K Jain, Dr.Arun K Jain, Theory of Structures, Lakshmi publications, 2017

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Regulation 2018		Semester V	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC302T	DESIGN OF STEEL STRUCTURES	3	0	0	3

Prerequisite Course (s)

Engineering Mechanics, Strength of Materials

Course Objective (s): The purpose of learning this course is to:

1	Familiarise knowledge on Limit State Design Methods for steel Structures and design of connections
2	Have knowledge on the design of tension members.
3	Expertise on the design of compression members.
4	Acquire knowledge on the design of beams.
5	Impart knowledge on the design of roof trusses

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Design of Bolted and Welded Connections
CO2	Design Tension Members and Splices
CO3	Design Compression Members, Lacings, Battens and Column Base
CO4	Design Laterally Supported and Unsupported Beams and Built-Up Beams.
CO5	Acquire Knowledge about Components of Industrial Structures and Design of Purlins.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO2	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO3	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO4	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO5	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Introduction to steel structures – Properties - Standard steel sections - IS800:2007 related provisions - Type of Loads on Structures and Load combinations - Design of bolted and welded connections for axial load - Efficiency of joint.		
UNIT II	**TENSION MEMBERS**	**9**
Introduction to types of Tension Members - Calculation of net area - Net effective sections for angles and Tee in tension - Design of tension members - Design of tension splices.		
UNIT III	**COMPRESSION MEMBERS**	**9**
Introduction to types of compression members - Codal provisions for compression members - Design of Compression Members - Design of lacings and battens - Design of column base: Slab Base.		
UNIT IV	**DESIGN OF BEAMS**	**9**
Introduction to design of flexural members - Classification of cross sections - Flexural Strength and Lateral stability of Beams - Shear Strength-Web Buckling, Crippling and defection of Beams - Design of laterally supported and unsupported beams.		
UNIT V	**ROOF TRUSSES AND INDUSTRIAL BUILDINGS**	**9**
Introduction to industrial building - roofing, cladding and wall material - structural components and framing -types of roof trusses - components - wind load estimation as per IS875 part 3 - design of purlins using Channel and Angle sections.		

Text Book (s)	
1	Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.
2	Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2014
Reference (s)	
1	Ramachandra, "Design of Steel Structures", Vol. I and II, Standard publishers Distributors, New Delhi, 2010
2	Negi.L.S, Design of Steel Structures, McGraw Hill Education, 2017.
Code Book(S):	
1	IS: 800 – 2007, "General Construction in Steel" - Code of Practice.
2	IS 875- 2015," Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Part 3: Wind Loads".
3	SP 6(I) – 1964, "Handbook for Structural Engineers".

Regulation 2018		Semester V	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC303T	HIGHWAY AND RAILWAY ENGINEERING	3	0	0	3

Prerequisite Course (s)

Construction Materials and Techniques

Course Objective (s): The purpose of learning this course is to:

1	Impart knowledge onplanning of highway and their alignment
2	Describe the geometric design of highways
3	Provide basic knowledge on the construction and maintenance of pavements
4	Outline the basics of railway engineering and railway components
5	Impart knowledge on construction and maintenance of railway tracks and introduction to other transportation systems

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Plan for a highway and its alignment
CO2	Understand the geometric design of highways
CO3	Know about the construction and maintenance of pavements
CO4	Comprehend the desirable properties of permanent way components
CO5	Understand the construction and maintenance of railway tracks

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	-	-	-	-	-	1	3	2
CO2	3	2	-	-	-	1	-	-	-	-	-	1	1	2
CO3	3	2	-	-	-	1	-	-	-	-	-	1	3	2
CO4	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	-	-	-	-	-	1	3	2
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	2.40	1.80

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	HIGHWAY PLANNING AND ALIGNMENT	9

Introduction – Modes of transportation - History of Road Construction – Significance of highway planning –Requirements of Ideal Alignment - Factors Controlling Highway Alignment - Engineering Surveys for Alignment - Conventional Methods and Modern Methods - Horizontal Curves - Super elevation - Design of Vertical Alignments- Gradients and its types

UNIT II	GEOMETRIC DESIGN OF HIGHWAYS	9

Highway Cross Sectional Elements - Sight Distances – Factors affecting Sight Distances - PIEV theory-Stopping Sight Distance (SSD) - Overtaking Sight Distance (OSD) [Problems in SSD and OSD] - Rigid and Flexible Pavements - Components and their Functions - Factors affecting the Design of Pavements

UNIT III	PAVEMENT CONSTRUCTION AND MAINTENANCE	9

Design Practice for Flexible Pavements [IRC Method and Recommendations only] - Design Practice for Rigid Pavements [IRC Recommendations- concepts only] - Construction Practice - Water Bound Macadam Road - Types of maintenance - Types of defects in Flexible pavements - Types of failures in Rigid Pavements - Optimum cost of maintenance - Evaluation of pavement Failure by Benkelman Beam Method [Procedure only].

UNIT IV	RAILWAY ENGINEERING	9

Introduction about traditional and metro system with advantages- Permanent way and its Components - Functions of each Component: Rails - Types of Rails, Rail fastenings- Concept of gauges- Coning of wheel - Gradient and grade compensation - super elevation - Cant deficiency -Negative super elevation.

UNIT V	RAILWAY TRACK CONSTRUCTION AND MAINTENANCE	9

Laying of Track - Points and Crossings - Fouling Mark- Design of Turnouts, Working Principle of Signaling–Maintenance: Conventional, Modern methods and Materials - Track Drainage - Layouts of Railway Stations and Yards, Rolling Stock.

Text Book (s)

1	KhannaS.K., C.E.G.Justo and Dr.A.Veeraraghavan, "Highway Engineering", Nemchand and Bros, 2018.
2	SaxenaSubhash C and Satyapal Arora, "A Text Book of Railway Engineering", DhanpatRai Publications Delhi, 2011

Reference (s)

1	Rangwala.S.C, "Railway Engineering" Charotar Publishing House Pvt.Ltd., Anand, India. 2017.
2	Subhash C Saxena, "Textbook of Highway and Traffic Engineering" CBS Publishers, 2017.
3	Sharma.S.K, "Principles, Practice and Design of Highway Engineering" S.Chand and Co, 2011.

Regulation 2018		Semester V	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC304T	IRRIGATION AND WATER RESOURCE ENGINEERING	3	0	0	3

Prerequisite Course (s)

Fluid Mechanics and Hydraulic Machinery

Course Objective (s): The purpose of learning this course is to:

1	Understand the irrigation system and needs
2	Different structures involved in irrigation system
3	Adopt the suitable irrigation methods for managing irrigation water
4	Explain the fundamentals of water resource engineering
5	Different phases in water resources management and national water policy

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Review the irrigation needs based crops and irrigation efficiency
CO2	Explain irrigation structure and other structures related to irrigation
CO3	Interpret the irrigation methods based on requirement and given conditions
CO4	Outline the water resources engineering importance and effective utilization
CO5	Paraphrase water resource plans, water policy of nations for water resources management

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	3	2	2
CO2	3	2	-	-	-	1	1	-	-	-	-	2	2	2
CO3	3	2	-	-	-	1	1	-	-	-	-	3	2	2
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION	9
Irrigation -Need, mode and influence of irrigation -Merits and Demerits - Crops and Seasons- Consumptive use of water -Duty- factors affecting duty - relationship between Duty, Delta and Base period - Irrigation efficiencies		
UNIT II	**IRRIGATION STRUCTURES**	**9**
Diversion and Impounding Structures - Types of Impounding structures - Gravity dam -forces acting on dam - Diversion Head works - Canal drop - Cross drainage works - Canal regulators – Canal Escape - Canal outlets - Canal lining - Kennedy's and Lacey's Regime theory (procedure only)		
UNIT III	**IRRIGATION METHODS AND MANAGEMENT**	**9**
Lift irrigation - Tank irrigation - Well irrigation - Irrigation methods: Surface and Sub Surface and Micro Irrigation - Merits and demerits - Irrigation scheduling - Participatory irrigation management		
UNIT IV	**WATER RESOURCE ENGINEERING**	**9**
Hydrological cycle - Water resource potential - Water resources of India and Tamil Nadu -Water requirements for irrigation and domestic purposes -Water quality - Optimum utilization of water resources in irrigation - Single and multipurpose reservoir - Strategies for reservoir operation		
UNIT V	**WATER RESOURCE MANAGEMENT**	**9**
Description of water resources planning - National Water Policy - Scope and aims of master plan - Concept of basin as a unit for development - Water budget- Conjunctive use of surface and ground water – Rain water harvesting - Watershed management		

Text Book (s)

1	Punmia B.C., et. al; Irrigation and Water Power Engineering, Laxmi Publications, New Delhi, 2012.
2	Garg S.K, "Irrigation Engineering and Hydraulic Structures" Khanna Publishers, New Delhi. 2012

Reference (s)

1	Sharma R.K and Sharma T.K' "Irrigation Engineering (Including Hydrology)", S.Chand and Co Ltd, New Delhi. 2009
2	Dilip Kumar Mujumdar, "Irrigation Water Management-Principlesand Practice", Prantice Hall of India (P) Ltd, New Delhi. 2014
3	Asawa, G.L., "Irrigation Engineering", New Age International Publishers, New Delhi, 2012.

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Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC305L	CONCRETE AND HIGHWAY ENGINEERING LABORATORY	0	0	4	2

Prerequisite Course (s)

Concrete Technology

Course Objective (s): The purpose of learning this course is to:

1	Study the properties of constituent materials, fresh concrete and mix design procedure.
2	Learn the tests on hardened concrete and how the different materials shall modify the performance of concrete
3	Know the properties of bitumen and their suitability.
4	Study the various tests carried out on Cement and Aggregates
5	Exposure on field tests on bitumen mixes

Course Outcome (s): After successful completion of the training the students will able to:

CO1	Assure the quality of coarse aggregate used in concrete.
CO2	Various workability tests on fresh concrete.
CO3	Ensure the strength characteristics of the given concrete.
CO4	Understand quality and grade check on bitumen.
CO5	Choose the correct grade bitumen for road works.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	3	1	1	-	1	1	-	1	2	2
CO2	3	2	2	2	3	1	1	-	1	1	-	1	2	2
CO3	3	2	2	2	3	1	1	-	1	1	-	1	2	2
CO4	3	2	2	2	3	1	1	-	1	1	-	1	2	2
CO5	3	2	2	2	3	1	1	-	1	1	-	1	2	2
CO (Avg)	3.00	2.00	2.00	2.00	3.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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LIST OF EXPERIMENTS

Test on Aggregates:

1. Specific gravity
2. Gradation of aggregate
3. Crushing strength
4. Abrasion value
5. Impact value
6. Water absorption
7. Flakiness and Elongation index

Test on Cement:

1. Fineness
2. Consistency
3. Initial and Final setting
4. Soundness
5. Compressive strength

Test on Fresh Concrete:

1. Slump cone test
2. Flow table
3. Compaction factor
4. Vee Bee test

Test on Hardened Concrete:

1. Compressive strength
2. Split tensile strength
3. Flexuretest
4. Non-destructive test by using Rebound Hammer

Test on Bitumen: (include Modified Bitumen)

1. Penetration
2. Softening point
3. Ductility
4. Viscosity

Tests on Bituminous Mixes:

1. Marshall stability and flow values (Demonstration Only)

Concrete Mix Design:

1. Mix design as per IS code

Code Book(S):

1	IS 383:1993 - Specification for Coarse And Fine Aggregates From Natural Sources For Concrete
2	IS 2386 (Part I to IV):1963- Methods of Test for Aggregates for Concrete, Part I: Particle Size and Shape
3	IS 1201 - 1220 (1978) - Methods for testing tars and Bituminous Materials
4	IRC SP 53:2010 - Guidelines on use of Modified Bitumen
5	IS 456:2000 - Plain and Reinforced Concrete - Code of Practice
6	IS 10262:2019 - Concrete Mix Proportioning – Guidelines

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Regulation 2018		Semester V	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP105L	MINOR PROJECT III	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

Identify the suitable idea and methods to develop the project idea into demonstrative or to explain the concepts in standard procedure and to prepare report

Course Outcome (s) (COs): At the end of this course, learners will be able to:

Identify the requirement and develop the concepts or models through standard procedure and preparation of report

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	1	1	1	1	1	-	1	2	2
CO (Avg)	3.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a project report after completing the work to the satisfaction.
- The student will be evaluated through continuous assessment by a panel formed under the approval of head of the department

Regulation 2018		Semester V	Total Hours			-
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP101N	MOOC I / INDUSTRIAL TRAINING I	0	0	2*	1

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1	Engagement of students facilitated by online resources to learn and admire knowledge
2	Interpret the skills and applications towards field knowledge.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Develop their carrier skill through online resources
CO2	Extend their skills and techniques applicable to field resources.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	-	1	1	1	-	1	2	1
CO2	3	3	2	2	1	1	-	1	1	1	-	1	2	1
CO (Avg)	3.00	3.00	2.00	2.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- For MOOC student can select course(s) based on interest or current needs and get approval from the head of the department. Students have to submit the progress to the faculty member assigned by the head of the department. Credit earned through the course can be transferred or guidelines need to be followed as per the regulation.
- For Industrial Training students need to get prior approval from the head of the department along with nomination of one external guide from the corresponding industry. And the progress of the student will be evaluated through continuous assessment by a panel framed under the approval of head of the department, followed by evaluation at the end of the semester based on the report and the viva voce examination by a team of internal examiner(s) assigned by head of the department

* Can be conducted as non-contact hours

Regulation 2018		Semester V	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM301L	ANALYTICAL AND LOGICAL THINKING SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Sharpen problem solving skills and to improve thinking capability of the students
2	Drive the students to use language with great commitment and cooperation
3	Expertise the creative thinking and presentation skills to meet the company needs

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in a fruitful manner
CO2	Organize and convey the information in such an incomparable way
CO3	Improve their presentation skills

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	2	-	-	-			
CO3	-	-	-	-	-	-	-	-	-	2	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	2.00	2.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Module - 1	6
Aptitude: Alligations or Mixtures - Blood Relations. **Communication:** How to set Goals - Interpersonal Relationships - JOHARI Window - Work & Business Etiquette		
UNIT II	**Module - 2**	**6**
Aptitude: Partnership - Statement and Assumptions. **Communication:** Transition to Corporate World - Career opportunities in Various Sectors and know your industry.		
UNIT III	**Module - 3**	**6**
Aptitude: Arithmetic and Geometric Progressions - Syllogisms. **Communication:** Time Management - Anger and Stress Management - Conflict Management.		
UNIT IV	**Module - 4**	**6**
Aptitude: Permutations and Combinations - Statements & Conclusions. **Communication:** Launch a Product - Telephonic Etiquette.		
UNIT V	**Module - 5**	**6**
Aptitude: Geometric Problems. **Communication:** Presentation Skills - Oral presentation and public speaking skills, Business presentations.		

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

Regulation 2018		Semester V/ VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM301T	INDIAN ART FORMS (Common to all UG Programmes)	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Introduce the learners to various art forms and whet their aesthetics sense.
CLR-2	Improve learners' knowledge on history of theatre and drama and draw connections between theatrical practices and social contexts in both modern and pre modern periods..
CLR-3	Enable the learners to identify and understanding various types of dance and music concepts
CLR-4	Make learners explore the diversity of Architecture, Sculpture, Painting and its intersection with community, culture and society.
CLR-5	Make students to get familiarized with the formal, historical, and theoretical aspects of literary arts.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify aesthetics traits found throughout Indian art.
CO2	Demonstrate understanding of the social and artistic movements that have shaped theatre and dance.
CO3	Recognize different concepts involved in music and dance.
CO4	Identify and appreciate the salient features and various styles of Indian Architecture, Sculpture and Painting at different times.
CO5	Demonstrate a broad understanding of Indian literary arts and appreciate the role that historical context plays in the creation and interpretation of literary works

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO3	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO4	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO5	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	1	2	2	1.6	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INDIAN ARTS	3
Introduction to art (aesthetics, taste)- fine arts - applied arts –Terminology - Subject matter -Art as propaganda - Purposes/uses of art.		
UNIT II	**THEATRE & DRAMA**	**3**
History of Theatre and Drama- Traditional Theatre forms- Modern Theatre and its characteristics-Puppetry –different forms and elements of drama.		
UNIT III	**MUSIC AND DANCES**	**3**
Origin of Music and Dance- Classical music and Carnatic Music- Regional Music -Musical Instruments-Regional Classical Dances.		
UNIT IV	**ARCHITECTURE, SCULPTURE, PAINTING**	**3**
History of architecture, sculpture, painting -Indo-Islamic Architecture- Temple Architecture– different types of Sculptures and its characteristics-Painting and its different styles.		
UNIT V	**LITERARY ARTS**	**3**
Ancient Indian Literature- Early Dravidian Literature- Medieval Literature- Modern Indian Literature-Contemporary Literature.		

Text Book (s)

	NIL

Reference (s)

1	Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Print world and National Museum Institute (Introduction).
2	Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
3	Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
4	Mitter, Partha, Indian Art, Oxford History of Art series, Oxford University Press, 2001

Regulation 2018		Semester V/VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM302T	SELF DEVELOPMENT AND ENTREPRENEURSHIP	1	0	0	Nil

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Develop entrepreneurship and self-employment abilities to start any venture plan, use, and monitor and control resources optimally and economically.
2	Know the Micro, small and medium industries Registration Process.
3	Study about product selection and development.
4	Learn about the Project report preparation.
5	Analysis the Enterprise risk management.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify entrepreneurial quality.
CO2	Know the entrepreneurial support agencies.
CO3	Prepare project setup planning and project report
CO4	Select appropriate agencies for technical and financial support.
CO5	Explain SWOT analysis and strategies to achieve goals.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	1	-	-	1	1	1	1	-	-
CO2	-	1	-	-	-	2	1	1	1	2	2	1	-	-
CO3	1	3	-	-	-	-	2	1	1	1	2	1	-	-
CO4	-	1	-	-	-	1	2	1	1	1	2	1	-	-
CO5	2	1	-	-	-	-	1	-	1	1	1	1		
CO (Avg)	1.50	1.50	-	-	-	1.33	1.50	1.00	1.00	1.20	1.60	1.00		

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	**INTRODUCTION TO SELF-EMPLOYMENT AND ENTREPRENEURSHIP DEVELOPMENT**	**6**
Introduction of self-employment – Characteristics- Creativity. Entrepreneurship development-Qualities of entrepreneur and Characteristics of Diploma holder as a self-employer like developing networking and personal contacts, importance of productivity, quality, cost consciousness and customers' satisfaction. Types of enterprise-Sole partnership -Partnership firm- Joint stock company- Co-operative society.		
UNIT II	**ENTREPRENEURIAL SUPPORT AGENCIES**	**6**
Definition – Micro, small and medium industries- Registration process of an enterprise with Government agencies-Name, type and role of state and national level support agencies. Current state & National Level Promotional Schemes for establishment of new.		
UNIT III	**PROJECT SET UP PLANNING**	**6**
Product Selection: importance- Product development stages. Process Selection: Factors affecting process selection - Technology lifecycle. Process Conversion-Capacity Planning: Basic method to assess / estimate capacity. Selection of location and layouts: Factors affecting selection of location - Objectives and types of plant layout.		
UNIT IV	**PROJECT PROPOSAL PLANNING**	**6**
7-M resources- Marketing- definition, need for enterprise, 4Ps channels- Market survey. Methods - Project report preparation for mechanical feature based product: Meaning of project planning and report: Feasibility study. Details required for preparing project plan. Project cost estimation.		
UNIT V	**ENTERPRISE AND RISK MANAGEMENT**	**6**
Concept of risk in the context of enterprise/ project-Uncertainty and certainty of project elements-Decision making under risk-Methods of risk management-Strength, Weakness, Opportunity and Threat (SWOT) analysis.		

Reference (s)

1	Entrepreneurship & Venture Management, Clifford and Bombak, JosephR.Momanso.
2	Small Industries management – Karmakar.M.B.
3	Creativity –Pradeep Khandwala
4	Entrepreneurship development and Management, R.K.Singal, S.K.Kataria Sons.

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Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH201T	MANAGEMENT PRINCIPLES FOR ENGINEERS	2	0	0	2

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Enable the students to study the evolution of management.
2	Study about planning tools and techniques in management for engineers.
3	Learn about career planning for engineers.
4	Enable the effective and barriers communication in the organization.
5	Study the system and process of effective controlling in the organization.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Acquired the knowledge on fundamental concept of management and its various functions.
CO2	Gained knowledge on planning and decision making process.
CO3	Attained the knowledge of organization structure and career planning.
CO4	Demonstrate the ability to directing, leadership and communicate effectively.
CO5	Analysis isolates issues and formulates best control methods.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	-	-	1	-	1	2	-	-
CO2	2	2	-	-	-	1	-	-	1	1	1	1	-	-
CO3	2	-	-	-	-	1	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	1	-	-	1	1	1	-	-	-
CO5	2	-	-	-	-	1	-	-	-	1	1	3	-	-
CO (Avg)	1.80	2.00	-	-	-	1.00	-	-	1.00	1.00	1.00	2.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO MANAGEMENT PRINCIPLES	6
Meaning, Definition of Management – Managerial Role - POSDCORB -Management vs. Administration- Evolution of Management Thoughts- Henry Fayol's 14 Principles- Opportunities and Challenges in Management.		
UNIT II	**PLANNING**	**6**
Nature and purpose of planning – Planning process – Types of planning – Objectives – Setting - Objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.		
UNIT III	**ORGANIZING**	**6**
Nature and purpose – Formal and informal organization – organization chart – Organization Structure– Types – Line and staff authority – Departmentalization – Delegation of Authority – Centralization and Decentralization – Job Design.		
UNIT IV	**DIRECTING**	**6**
Foundations of individual and group behavior – Motivation – Motivation Theories – Motivational - Techniques –Leadership – Types and Theories of Leadership – Communication – Process of Communication – Barrier in Communication – Effective Communication.		
UNIT V	**CONTROLLING**	**6**
System and Process of Controlling – budgetary and Non-Budgetary Control Techniques – Use of Computers and IT in Management control – Control and performance – Direct and Preventive control – Reporting.		

Reference (s)

1	P.C.Tripathi., P.N Reddy, Principles of Management, McGraw Hill, 5th Edition 2012.
2	Harold Koontz, Heinz Weihrich, A RamachandraAryasri, Tata McGraw Hill, Principles of Management, 2016
3	Charles W Hill, Stephen L Mcshane, Principles of Management, McGraw Hill, Special Indian Edition 2007.
4	1.Stephen A. Robbins & David A. Decenzo& Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011.
5	Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.

Regulation 2018		Semester VI	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC306T	FOUNDATION ENGINEERING	3	0	0	3

Prerequisite Course (s)

Soil mechanics

Course Objective (s): The purpose of learning this course is to:

1	Get basic knowledge of the geotechnical site investigation.
2	Learn pressure distribution below the footing and calculate bearing capacity of soil.
3	Understand the types of foundation and design principles
4	Discuss different types of pile foundation and its capacity
5	Study various earth pressure theories.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Enumerate methods of subsurface exploration and site investigation
CO2	Estimate the load carrying capacity of different types of foundation
CO3	Propose and design of shallow foundation
CO4	Calculate the load carrying capacity and design of pile foundation
CO5	Compute the earth pressure and stability of retaining walls

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	1	-	-	-	-	1	1	1
CO2	3	2	1	-	-	1	-	-	-	-	-	1	1	1
CO3	3	2	-	-	-	1	-	-	-	1	-	1	1	-
CO4	3	2	1	-	-	1	1	-	-	-	-	1	1	-
CO5	3	2	-	-	-	1	-	-	-	1	-	1	1	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	SITE INVESTIGATION AND SELECTION OF FOUNDATION	9

Objectives of Site Investigation - Stages and planning – Methods of Site Investigation - Depth of subsurface exploration and Spacing of bore holes - Geophysical methods – Electrical resistivity Method – Seismic refraction method – Standard penetration test – Static Cone Penetration test– Dynamic Penetration– Bore log report Requirements of good foundation - Factors governing location and depth of foundation-Types and Selection of foundation.

UNIT II	SHALLOW FOUNDATION	9

Bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's formula and BIS formula - Bearing Capacity from in-situ tests (SPT, SCPT and Plate load) - Settlement - Components of settlement - Determination of settlement of foundations on granular and clay deposits - Allowable settlements (As per IS Codal provisions) - Methods of minimising total and differential settlement – Correction on water table.

UNIT III	FOOTINGS AND RAFTS	9

Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum thickness for rigid behaviour – Applications – Compensated foundation – Codal provision – Introduction on Machine Foundation.

UNIT IV	DEEP FOUNDATION	9

Consideration leading to selection of pile foundation - functions and types of pile foundation – Bearing capacity failure in piles - Seismic considerations in bearing capacity evaluation - Estimating load carrying capacity of piles by Static approach – Dynamic Formulae – Pile Load Test – Negative skin friction in piles – Use of under-reamed piles in expansive soils - Pile Group – Efficiency of Pile Group – Settlement of piles and pile groups - Methods of constructing - Pile foundations – Deep excavation – Pile foundation in water logged areas.

UNIT V	RETAINING WALLS	9

Plastic equilibrium in soils – Active and passive states – Rankine's theory – Cohesion less and cohesive soil – Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann's Graphical method – Pressure on the wall due to line load – Stability analysis of retaining walls – Codal provisions.

Text Book (s)

1	Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th Edition, 2017 (Reprint).
2	Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition 2017.

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Reference (s)	
1	Joseph E Bowles, "Foundation Analysis and design", McGraw Hill Education, 5th Edition, 28th August 2015.
2	Kaniraj, S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi, 2014.

Code Book(s):

IS Code 6403: 1981 (Reaffirmed 1997) "Bearing capacity of shallow foundation", Bureau of Indian Standards, New Delhi.

IS Code 8009 (Part 1):1976 (Reaffirmed 1998) "Shallow foundations subjected to symmetrical static vertical loads", Bureau of Indian Standards, New Delhi.

IS Code 8009 (Part 2):1980 (Reaffirmed 1995) "Deep foundations subjected to symmetrical static vertical loading", Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 1): 1979 (Reaffirmed 1997) "Concrete Piles" Bureau of Indian Standards, New Delhi. 8. IS Code 2911 (Part 2): 1979 (Reaffirmed 1997) "Timber Piles", Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 3): 1979 (Reaffirmed 1997) "Under Reamed Piles", Bureau of Indian Standards, New Delhi.

IS Code 2911 (Part 4): 1979 (Reaffirmed 1997) "Load Test on Piles", Bureau of Indian Standards, New Delhi.

IS Code 1904: 1986 (Reaffirmed 1995) "Design and Construction of Foundations in Soils", Bureau of Indian Standards, New Delhi.

IS Code 2131: 1981 (Reaffirmed 1997) "Method for Standard Penetration test for Soils", Bureau of Indian Standards, New Delhi.

IS Code 2132: 1986 (Reaffirmed 1997) "Code of Practice for thin – walled tube sampling for soils", Bureau of Indian Standards - New Delhi.

IS Code 1892 (1979): Code of Practice for subsurface Investigation for Foundations. Bureau of Indian Standards, New Delhi.

IS Code 14458 (Part 1): 1998 "Retaining Wall for Hill Area – Guidelines, Selection of Type of Wall", Bureau of Indian Standards, New Delhi.

IS Code 14458 (Part 2): 1998 "Retaining Wall for Hill Area – Guidelines, Design of Retaining/Breast Walls", Bureau of Indian Standards, New Delhi.

IS Code 14458 (Part 3): 1998 "Retaining Wall for Hill Area – Guidelines, Construction Of Dry Stone Walls", Bureau of Indian Standards, New Delhi.

Regulation 2018		Semester VI	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC307T	DESIGN OF REINFORCED CONCRETE STRUCTURES	3	0	0	3

Prerequisite Course (s)

Strength of Materials, Analysis of Structures

Course Objective (s): The purpose of learning this course is to:

1	Develop an understanding on the basic concepts in the behavior and design of reinforced concrete systems and elements using limit state method.
2	Learn the design of slab using virtual work method and design of staircase
3	Introduce the design principles of RC members for shear, bond, and torsion.
4	Introduce the concepts in the design of RC Column design.
5	Accrue knowledge in the concept of RC footings.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Design flexural members using limit state method under different loading conditions.
CO2	Design of slab for various end condition and design of staircase.
CO3	Design flexural members for shear, bond, and torsion.
CO4	Design RC columns of any cross section with different end conditions.
CO5	Design the footing according to column positioning

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO3	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO4	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO5	3	2	1	-	-	1	1	-	-	1	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9

Objective of structural design - Types of reinforcements - Stress strain curve for concrete, reinforcing steel - Type of Loads on Structures and Load combinations - RCC Structural Design Process - Concept of elastic method, ultimate load method and limit state method - Advantages– Limit state philosophy and assumptions as detailed in IS code – Design of codes and specification - Analysis and design of singly and doubly reinforced rectangular and flanged beams.

UNIT II	DESIGN OF SLABS AND STAIRCASE	9

Concepts – Assumptions –Methods of analysis - Application of virtual work method to square, rectangular slabs - Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects- Design of Flat slab- Types of Staircases – Design of dog-legged Staircase.

UNIT III	DESIGN OF SHEAR, TORSION	9

Behaviour of RC members in Bond and anchorage – Design requirements as per current code - Behaviour of rectangular RC beams in shear and torsion – Design of RC members for combined Bending, Shear and Torsion.

UNIT IV	DESIGN OF COLUMNS	9

Types of columns – Eccentricity – Analysis and design of short column for axial, Uniaxial and Biaxial bending - Design of slender column.

UNIT V	DESIGN OF FOOTING	9

Design of axially and eccentrically loaded rectangular footing - Design of combined rectangular footing for two columns only

Text Book (s)

1	Unnikrishnan Pillai and DevdassMenon - Reinforced Concrete Design - Tata McGraw Hill PublishingCompany Ltd. 2016.
2	N.KrishnaRaju "Design of Reinforced Concrete Structures: IS:456-2000, Fourth edition, CBS Publishers and distributors, Pvt. Ltd.2016

Reference (s)

1	Punmia B.C. Ashok K. Jain and Arun K. Jain, Limit State design of Reinforced Concrete, Laxmi Publications (P) Ltd., New Delhi, 2016.
2	Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2013.
3	Gambhir M L, Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt Limited, 2017
4	Purushothaman.P "Reinforced Concrete Structural Elements" Tata McGraw Hill Publishing Co. Ltd., 2007.

Code Book(S):	
1	IS 456: 1978 Design Aids for Reinforced Concrete to IS 456: 1978, BIS, New Delhi
2	IS 456: 2000 Plain and Reinforced Concrete - Code of Practice, BIS, New Delhi
3	SP 6(I) – 1964, "Handbook for Structural Engineers".
4	SP 16:1980 Design Aids for Reinforced Concrete to IS 456:1978.
5	SP 34:1987 Handbook of Concrete Reinforcement and Detailing.

Regulation 2018		Semester VI	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC308L	SURVEY CAMP	0	0	4	2

Prerequisite Course (s)

Surveying, Surveying Laboratory

Course Objective (s): The purpose of learning this course is to:

The objective of the survey camp is to enable the students to get practical training in the field work. Groups of not more than five members in a group will carry out each exercise in survey camp. The camp must involve work on a large area of not less than 30 acres. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plots.

Course Outcome (s): After successful completion of the training the students will able to:

CO1	Measure the length and area of field by using Modern Equipment.
CO2	Obtain the horizontal and vertical angles in field by using Theodolite.
CO3	Know the earth work required for levelling.
CO4	Know how to rectify the errors in measurement while measuring in the field.
CO5	Give the practical exposure about the survey work before the construction.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	2	1	1	-	1	1	-	1	2	1
CO2	3	2	2	-	2	1	1	-	1	1	-	1	2	1
CO3	3	2	2	-	2	1	1	-	1	1	-	1	2	1
CO4	3	2	2	-	-	1	1	-	1	1	-	1	2	1
CO5	3	2	2	-	-	1	1	-	1	1	-	1	2	1
CO (Avg)	3.00	2.00	2.00	0.00	2.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

LIST OF EXPERIMENTS

Two weeks Survey Camp will be conducted during summer vacation in the following activities:

1. Traversing
   i. Theodolite Traversing
   ii. Traversing using GPS
2. Contouring
   i. Radial contouring - Radial Line at Every 30 Degree and Length not less than 60 Meter on each Radial Line
   ii. Block Level/ By squares of size at least 100 Meter x 100 Meter at least 20 Meter interval
3. Longitudinal section and cross section of road alignment for a Length of not less than 1 Kilo Meter at least L.S. at every 30M and C.S. at every 90 M
4. Use of GPS to determine latitude and longitude and locate the survey camp location.
5. Setting out of simple curve
6. Determination of distance and difference in elevation between two inaccessible points
7. Determination of elevation of an object using single plane method when base is accessible/inaccessible.
8. Calculation of area and volume using modern equipments

Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC309L	COMPUTER AIDED DESIGN AND DRAFTING LABORATORY	0	0	2	1

Prerequisite Course (s)

Analysis of Structures, Design of Reinforced Concrete Structures, Design of Steel Structures

Course Objective (s): The purpose of learning this course is to:

1	Provide Knowledge on Design and Detailing of Slab and Staircase
2	Familiarize on Design and Detailing of Beam
3	Expertise on Design and Detailing of Column and Footing
4	Know the Concepts of Tension Member with Steel Connection
5	Familiarize on Design of Compression Member

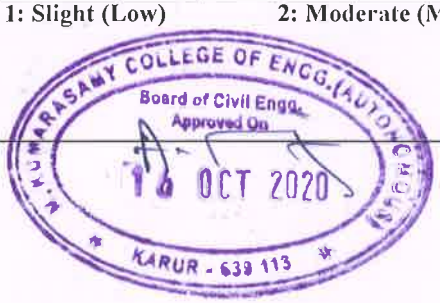
Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the Different end Boundary Condition for Slab and Staircase.
CO2	Familiarize the Concept Adopted in Different Types of Column and Footing.
CO3	Design Flexural Members Using Limit State Method Under Different Loading and End Conditions.
CO4	Have Fundamental Understanding of Tension Member Using Bolted and Welded Connection.
CO5	Solve Various Elements of Compression Member.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	1	1	-	-	1	-	1	2	1
CO2	3	2	1	-	1	1	1	-	-	1	-	1	2	1
CO3	3	2	1	-	1	1	1	-	-	1	-	1	2	1
CO4	3	2	1	-	1	1	1	-	-	1	-	1	2	1
CO5	3	2	1	-	1	1	1	-	-	1	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



LIST OF EXPERIMENTS	30

1. Design and Detailing of Slab with boundary conditions
2. Design and Detailing of T beam
3. Design and Detailing of Singly, Doubly Reinforced Beam
4. Design and Detailing of Axial, Uniaxial, Biaxial column
5. Design and Detailing of Dog legged Staircase
6. Design and Detailing of Isolated Footing
7. Design of Tension Member with Bolted and Welded Connection
8. Design of Laced and Battened Column
9. Design of Slab Base
10. Design of Purlin

Reference (s):

1	Unnikrishnan Pillai and DevdassMenon - Reinforced Concrete Design - Tata McGraw Hill PublishingCompany Ltd. 2016.
2	KrishnaRaju N, "Design of Reinforced Concrete Structures: IS:456-2000, Fourth edition, CBS Publishers and distributors, Pvt. Ltd.2016
3	PunmiaB.C. Ashok K. Jain and Arun K. Jain, Limit State design of Reinforced Concrete, Laxmi Publications (P) Ltd., New Delhi, 2016.
4	Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2013.
5	Gambhir M L, Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt Limited, 2017

Code Book(s):

1.	IS 456: 1978 Design Aids for Reinforced Concrete to IS 456: 1978, BIS, New Delhi
2.	IS 456: 2000 Plain and Reinforced Concrete - Code of Practice, BIS, New Delhi
3.	SP 6(I) – 1964, "Handbook for Structural Engineers".
4.	SP 16:1980 Design Aids for Reinforced Concrete to IS 456:1978.
5.	SP 34:1987 Handbook of Concrete Reinforcement and Detailing.
6.	IS: 800 – 2007, "General Construction in Steel" - Code of Practice.
7.	IS 875- 2015"Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Part 3: Wind Loads".

Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP106L	MINOR PROJECT IV	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

Identify the suitable idea and methods to develop the project idea into demonstrative or to explain the concepts in standard procedure and to prepare report

Course Outcome (s) (COs): At the end of this course, learners will be able to:

Identify the requirement and develop the concepts or models through standard procedure and preparation of report

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	2	2	1	1	1	1	1	1	2	2
CO (Avg)	3.00	2.00	3.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a project report after completing the work to the satisfaction.
- The student will be evaluated through continuous assessment by a panel formed under the approval of head of the department

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Regulation 2018		Semester VI	Total Hours			-
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP101N	MOOC II / INDUSTRIAL TRAINING II	0	0	2*	1

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1	Engagement of students facilitated by online resources to learn and admire knowledge
2	Interpret the skills and applications towards field knowledge.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Develop their carrier skill through online resources
CO2	Extend their skills and techniques applicable to field resources.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	-	1	1	1	-	1	2	1
CO2	3	3	2	2	1	1	-	1	1	1	-	1	2	1
CO (Avg)	3.00	3.00	2.00	2.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- For MOOC student can select course(s) based on interest or current needs and get approval from the head of the department. Students have to submit the progress to the faculty member assigned by the head of the department. Credit earned through the course can be transferred or guidelines need to be followed as per the regulation.
- For Industrial Training students need to get prior approval from the head of the department along with nomination of one external guide from the corresponding industry. And the progress of the student will be evaluated through continuous assessment by a panel framed under the approval of head of the department, followed by evaluation at the end of the semester based on the report and the viva voce examination by a team of internal examiner(s) assigned by head of the department

* Can be conducted as non-contact hours

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Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM302L	EMPLOYABILITY SKILLS AND PRACTICES	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Learn the application of mathematical or statistical models to different real-world contexts
2	Focus on writing & speaking skills through vigorous practices.
3	Enhance soft skills and analytical ability of students
4	Defeat the fear while communicating in group and to master the effective communication

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in a productive manner
CO2	Launch their ability of comprising and delivering the information
CO3	Upgrade their communication quality in near future

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	3	-	-	-			
CO3	-	-	-	-	-	-	-	-	-	3	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	3.00	3.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Module - 1	6
Aptitude: Time and Distance (Speed, Streams) - Problems on Trains - Arrangements and BloodRelations. **Communication:** Job Application - Cover letter,Bio-data,Resume& CV building.		
UNIT II	Module - 2	6
Aptitude: Time and Work - Pipes & Cisterns - Situation Reaction Test & Data Interpretations. **Communication:** Writing practices on circulars, notices, memos, Agenda preparation and Minutes of meeting.		
UNIT III	Module - 3	6
Aptitude: Ages - Averages - Probability - Profit and Loss. **Communication:** Email Etiquette - Essay writing.		
UNIT IV	Module - 4	6
Aptitude: Mensuration - SI & CI - Cause and Effect Analysis - Statement, Assumptions & Conclusions. **Communication:** Group Discussion and guidelines.		
UNIT V	Module - 5	6
Aptitude: Permutation and Combinations - Partnership - Alligations or Mixtures. **Communication:** Interview skills - General instructions, Review of interview questions, Mock Interviews.		

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

Regulation 2018		Semester V/ VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM301T	INDIAN ART FORMS (Common to all UG Programmes)	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Introduce the learners to various art forms and whet their aesthetics sense.
CLR-2	Improve learners' knowledge on history of theatre and drama and draw connections between theatrical practices and social contexts in both modern and pre modern periods..
CLR-3	Enable the learners to identify and understanding various types of dance and music concepts
CLR-4	Make learners explore the diversity of Architecture, Sculpture, Painting and its intersection with community, culture and society.
CLR-5	Make students to get familiarized with the formal, historical, and theoretical aspects of literary arts.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify aesthetics traits found throughout Indian art.
CO2	Demonstrate understanding of the social and artistic movements that have shaped theatre and dance.
CO3	Recognize different concepts involved in music and dance.
CO4	Identify and appreciate the salient features and various styles of Indian Architecture, Sculpture and Painting at different times.
CO5	Demonstrate a broad understanding of Indian literary arts and appreciate the role that historical context plays in the creation and interpretation of literary works

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO3	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO4	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO5	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	1	2	2	1.6	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INDIAN ARTS	3
Introduction to art (aesthetics, taste)- fine arts - applied arts –Terminology - Subject matter -Art as propaganda - Purposes/uses of art.		
UNIT II	**THEATRE & DRAMA**	**3**
History of Theatre and Drama- Traditional Theatre forms- Modern Theatre and its characteristics-Puppetry –different forms and elements of drama.		
UNIT III	**MUSIC AND DANCES**	**3**
Origin of Music and Dance- Classical music and Carnatic Music- Regional Music -Musical Instruments-Regional Classical Dances.		
UNIT IV	**ARCHITECTURE, SCULPTURE, PAINTING**	**3**
History of architecture, sculpture, painting -Indo-Islamic Architecture- Temple Architecture– different types of Sculptures and its characteristics-Painting and its different styles.		
UNIT V	**LITERARY ARTS**	**3**
Ancient Indian Literature- Early Dravidian Literature- Medieval Literature- Modern Indian Literature-Contemporary Literature.		

Text Book (s)

	NIL

Reference (s)

1	Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Print world and National Museum Institute (Introduction).
2	Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
3	Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
4	Mitter, Partha, Indian Art, Oxford History of Art series, Oxford University Press, 2001

Regulation 2018		Semester V/VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM302T	SELF DEVELOPMENT AND ENTREPRENEURSHIP	1	0	0	Nil

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Develop entrepreneurship and self-employment abilities to start any venture plan, use, and monitor and control resources optimally and economically.
2	Know the Micro, small and medium industries Registration Process.
3	Study about product selection and development.
4	Learn about the Project report preparation.
5	Analysis the Enterprise risk management.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify entrepreneurial quality.
CO2	Know the entrepreneurial support agencies.
CO3	Prepare project setup planning and project report
CO4	Select appropriate agencies for technical and financial support.
CO5	Explain SWOT analysis and strategies to achieve goals.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	1	-	-	1	1	1	1	-	-
CO2	-	1	-	-	-	2	1	1	1	2	2	1	-	-
CO3	1	3	-	-	-	-	2	1	1	1	2	1	-	-
CO4	-	1	-	-	-	1	2	1	1	1	2	1	-	-
CO5	2	1	-	-	-	-	1	-	1	1	1	1		
CO (Avg)	1.50	1.50	-	-	-	1.33	1.50	1.00	1.00	1.20	1.60	1.00		

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	**INTRODUCTION TO SELF-EMPLOYMENT AND ENTREPRENEURSHIP DEVELOPMENT**	**6**
Introduction of self-employment – Characteristics- Creativity. Entrepreneurship development-Qualities of entrepreneur and Characteristics of Diploma holder as a self-employer like developing networking and personal contacts, importance of productivity, quality, cost consciousness and customers' satisfaction. Types of enterprise-Sole partnership -Partnership firm- Joint stock company- Co-operative society.		
UNIT II	**ENTREPRENEURIAL SUPPORT AGENCIES**	**6**
Definition – Micro, small and medium industries- Registration process of an enterprise with Government agencies-Name, type and role of state and national level support agencies. Current state & National Level Promotional Schemes for establishment of new.		
UNIT III	**PROJECT SET UP PLANNING**	**6**
Product Selection: importance- Product development stages. Process Selection: Factors affecting process selection - Technology lifecycle. Process Conversion-Capacity Planning: Basic method to assess / estimate capacity. Selection of location and layouts: Factors affecting selection of location - Objectives and types of plant layout.		
UNIT IV	**PROJECT PROPOSAL PLANNING**	**6**
7-M resources- Marketing- definition, need for enterprise, 4Ps channels- Market survey. Methods - Project report preparation for mechanical feature based product: Meaning of project planning and report: Feasibility study. Details required for preparing project plan. Project cost estimation.		
UNIT V	**ENTERPRISE AND RISK MANAGEMENT**	**6**
Concept of risk in the context of enterprise/ project-Uncertainty and certainty of project elements-Decision making under risk-Methods of risk management-Strength, Weakness, Opportunity and Threat (SWOT) analysis.		

Reference (s)

1	Entrepreneurship & Venture Management, Clifford and Bombak, JosephR.Momanso.
2	Small Industries management – Karmakar.M.B.
3	Creativity –Pradeep Khandwala
4	Entrepreneurship development and Management, R.K.Singal, S.K.Kataria Sons.

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Regulation 2018		Semester VII	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH202T	SOCIAL ENGINEERING	2	0	0	2

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Learn about fundamental concept of social engineering
2	Know the different elements of ethical hacking and social engineering.
3	Understand the concepts of threats and attack vectors
4	Understand the ethical hacking
5	Learn about the attacks against individuals and organizations

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the concept of social engineering and types of attacks.
CO2	Identify the key security concepts, CIA and IT governance and best practices
CO3	Understand principles of social engineering.
CO4	Exhibit the ethical hacking concepts and scopes, threats and attack vectors and common areas of vulnerability.
CO5	Gain knowledge of attacks against individuals and organizations.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	1	1	1	1	1	-	1	-	-
CO2	1	1	-	-	-	2	-	2	1	-	-	1	-	-
CO3	-	1	-	-	-	-	1	2	1	-	-	1	-	-
CO4	-	-	-	-	-	-	-	3	-	-	-	1	-	-
CO5	1	1	-	-	-	-	-	-	1	1	-	1	-	-
CO (Avg)	1.33	1.25	-	-	-	1.50	1.00	2.00	1.00	1.00		1.00		-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO SOCIAL ENGINEERING	6
Social Engineering Defined - Why Does Social Engineering Work - Identify Communication Style - key aspects of social engineering - Categories of Social Engineering Attacks – human – based attacks and technology - based attacks		
UNIT II	**KEY SECURITY**	**6**
Key security - concepts - Types of key security concepts – Cyber security position. The CIA Triad - the significance of incident response and frameworks around cyber security. IT Governance - Best practices - compliance.		
UNIT III	**PSYCHOLOGY OF SOCIAL ENGINEERING**	**6**
Mind Tricks: Psychological Principle - Four fundamental aspects of human nature that social engineers - the desire to be helpful - the tendency to be trusting - the fear of offending others - the tendency to cut corners		
UNIT IV	**ETHICAL HACKING AND SOCIAL ENGINEERING**	**6**
Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modelling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defence Strategies. Common Areas of Vulnerability - Appropriate access - Assessed resistance - Information availability		
UNIT V	**CASES OF SOCIAL ENGINEERING**	**6**
Notable Cases of Social Engineering - Attacks against Individuals - Attacks against Organizations - Preventing Social Engineering Attacks - Mitigating the Damage of Social Engineering Attacks - Segregation of Access - Maintain Access Logs - Ensure That Backups Occur Regularly - Automatically Revoke User Privileges If Suspicious Activity Is Detected		

Reference (s)

1	Kevin D. Mitnick, William L. Simon, Steve Wozniak, The Art of Deception: Controlling the Human Element of Security, Wiley, October 17th 2003
2	Christopher Hadnagy, Social Engineering: The Science of Human Hacking Paperback- Wiley Publishing Inc.,Edition 2018
3	Lester Evans, Cybersecurity: An Essential Guide to Computer and Cyber Security for Beginners, Including Ethical Hacking, Risk Assessment, Social Engineering, Attack and Defense Strategies, and Cyberwarfare Paperback –2018
4	Dr. Erdal Ozkaya, Learn Social Engineering: Learn the art of human hacking with an internationally renowned expert-2018

Regulation 2018		Semester VII	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC401J	ESTIMATION AND QUANTITY SURVEYING	3	0	2	4

Prerequisite Course (s)

Construction Materials and Techniques, Design of Reinforced Concrete Structures

Course Objective (s): The purpose of learning this course is to:

1	Identify various items of work in a building and calculate their quantities using appropriate methods.
2	Understand the concepts behind the preparation of estimate of the various civil engineering works.
3	Impart the knowledge on basic concepts related to estimate preparation.
4	Analyse the rate of a work item according to the specification.
5	Understand the terminologies and concepts behind the valuation of properties, depreciation and time value of money.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Prepare various types of estimation and find out the quantity of works involved.
CO2	Carry out analysis of rates and bill preparation using spreadsheets.
CO3	Prepare specifications for various items of construction works
CO4	Estimate the quantity of works involved in road works, water supply and sanitary works.
CO5	Estimate the value of buildings

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	1	1	-	-	-	-	1	3	2
CO2	3	2	1	-	1	1	1	-	-	-	-	1	3	2
CO3	3	2	1	-	1	1	1	-	-	-	-	1	3	2
CO4	3	2	-	-	1	1	1	-	-	-	-	1	3	2
CO5	3	2	1	-	1	1	1	-	-	-	-	1	3	2
CO (Avg)	3.00	2.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	3.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	ESTIMATE OF BUILDING	9

Types of estimates – Units of measurements – Methods of estimates – Advantages. Quantity estimate for load bearing and framed structures - brick work and RCC works only, Steel requirement and Bar bending schedule - Calculation of quantities of earth work excavation, brickwork, PCC, RCC, Plastering, white washing, colour washing and painting/varnishing for shops and residential building with flat roof.

UNIT II	ESTIMATE OF OTHER STRUCTURES	9

Estimating of septic tank, soak pit – Retaining wall– Culvert - estimate of bituminous and cement concrete roads.

UNIT III	ANALYSIS OF RATES AND SPECIFICATIONS	9

Data – Schedule of rates – Analysis of rates – Specifications – sources – General and Detailed specifications-Material Calculations for each work- Material cost.

UNIT IV	VALUATION	9

Necessity – Different methods of valuation of a building – capitalized value – Depreciation – Escalation – Value of building – Calculation of Standard rent - Mortgage - lease.

UNIT V	REPORT PREPARATION	9

Principles for report preparation – report on estimate of residential and industrial building – Roads – Water supply and sanitary installations.

LIST OF EXPERIMENTS	30

The following list of experiments can be carried out by using software tools:

1. Estimation of residential building
2. Estimation of framed structures
3. Estimation of Septic tanks and soak pit
4. Estimation of Industrial Building
5. Estimation of Box Culvert
6. Estimation of Retaining wall
7. Estimation of Irrigation work
8. Estimation of Road
9. Valuation of residential building
10. Valuation of industrial building

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Text Book (s)	
1	Dutta.B.N, "Estimating and Costing in Civil Engineering", UBS Publishers and Distributors Pvt. Ltd., 2003.
2	Chakraborti M, "Estimation, Costing, Specification and Valuation in Civil Engineering (including Computer estimation)", 2001.
Reference (s)	
1	Kohli, D.D and Kohli,R.C, "A text book of Estimating and Costing (Civil)", S.Chand and Company Ltd., 2004.
2	Rangwala S C, "Estimating, Costing and Valuation", Charotar Publishing House", 2001.
3	Estimating and Costing: Including Quantity Surveying, Tendering and Evaluation Kataria and Sons, 2010

Regulation 2018		Semester VII	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PCC	18CEC402T	CONSTRUCTION ENGINEERING AND MANAGEMENT	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1	Learn the principles of management
2	Understand the fundamental principles of construction management and resource planning.
3	Study the scheduling methods, execution procedure and financial control process.
4	Extend resource allocation and work execution sequence
5	Utilise quality and safety in construction

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify the principles of management hierarchy of organization
CO2	Extend the principles to planning and cash flow
CO3	Compute the process of planning and scheduling methods
CO4	Describe about basic ability to plan, control and monitor construction projects with respect to time and cost
CO5	Outline the safety and quality procedure in construction

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO2	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO3	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO4	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO5	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	PRINCIPLES OF CONSTRUCTION MANAGEMENT	9
Definition – importance – functions of construction management – construction participants – Role and responsibilities of client, construction management consultant, architect and contractor – organization – types of organizations - hierarchy of organization		
UNIT II	**CONSTRUCTION PLANNING**	**9**
Basic concepts in the development of construction plans – importance of construction planning – different types of construction project – project life cycle – project feasibility report – techno economic feasibility report – detailed project report -construction stages - Funds: cash flow,sources of funds		
UNIT III	**METHODS OF CONSTRUCTION MANAGEMENT**	**9**
Scheduling methods - Bar chart (Gantt chart) -Concepts of network -Network planning methods CPM and PERT - identification of critical path, project duration and total float-Management by network analysis - preparation of charts for staff, labour, material, plant and machinery requirements.		
UNIT IV	**EXECUTION OF WORKS**	**9**
Choice of technology - planning and organizing construction site and resources - Manpower: planning, organizing, staffing, motivation - Materials: concepts of planning, procurement and inventory control -Contractors: Contract system – types of engineering contracts – specifications, documents, procedures, conditions.		
UNIT V	**PROJECT MONITORING AND CONTROL**	**9**
Basics of modern project management - use of Building Information Modelling (BIM) in project management. - Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection. - Safety at construction site – Accidents: causes, effects and preventive measures - costs of accidents - occupational health problems in construction		

Text Book (s)

1	Seetharaman.S, "Construction Engineering and Management", UmeshPublications,2017.
2	SangaReddy,S., and Meyyappan, PL., "Construction Management", KumaranPublications, Coimbatore, 2004.

Reference (s)

1	Varghese .P.C., "Building Construction", Prentice Hall India, 2007.
2	Chitkara,K.K., "Construction Project Management", Tata McGraw-Hill Publishing co,2014
3	Punmia.B.C., Khandelwal.K.K., "Project Planning with PERT and CPM", Laxmi Publications, 2016.
4	Jha, Kumar Neeraj, "Construction Project management, Theory and Practice", Pearson Education India, 2015.

Regulation 2018		Semester VII	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP107L	DESIGN PROJECT	0	0	4	2

Prerequisite Course (s)

Analysis of Structures, Design of Reinforced Concrete Structures, Design of Steel Structures

Course Objective (s): The purpose of learning this course is to:

Develop the knowledge to formulate a real-world problem, project goals, learn new tools, techniques, standard procedures and to prepare report

Course Outcome (s) (COs): At the end of this course, learners will be able to:

Formulate a real-world problem, identify the requirement and develop the design solutions, preparation of report and present the oral demonstration

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	-	1	1	1	-	1	2	2
CO (Avg)	3.00	3.00	2.00	2.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy(s)

- The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction.
- The student will be evaluated through continuous assessment by a panel formed under the approval of head of the department, followed by evaluation at the end of the semester based on the report and the viva voce examination by a team of examiners including one external examiner.

Regulation 2018		Semester VIII	Total Hours			240
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PROJ	18CEP108L	MAIN PROJECT	0	0	16	8

Prerequisite Course (s)

Design Project and other related course(s)

Course Objective (s): The purpose of learning this course is to:

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

On Completion of the project work students will be able to take up any difficult practical problems and discover it by formulating proper methodology.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	1	1	1	1	1	1	3	2
CO (Avg)	3.00	3.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Strategy (s)

- The student(s) works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department.
- A project report is required at the end of the semester. The project work is evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE001T	AIRPORT AND HARBOUR ENGINEERING	3	0	0	3

Prerequisite Course (s)

Highway and Railway Engineering

Course Objective (s): The purpose of learning this course is to:

1	Impart knowledge on air transport characteristics and planning ofairport and its layout
2	Describe the design of runway and taxiway geometrics of an airport
3	Outline the basics of air traffic control, airport drainage and lighting of runway, taxiway and approach areas
4	Provide basic knowledge on harbour site selection, components of harbour and port layout
5	Impart knowledge on coastal structures, mooring, berthing facilities and navigational aids

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Plan various components of an airport and it's layout
CO2	Understand design of runway and taxiway geometrics of an airport
CO3	Know aboutair traffic control and lighting pattern
CO4	Apply knowledge on planning of harbour and construction of port
CO5	Understand the importance of various coastal structures

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	1	-	-	-	-	-	-	2	1
CO2	3	2	-	-	-	1	-	-	-	-	-	1	3	2
CO3	3	2	-	-	-	1	-	-	-	-	-	1	2	3
CO4	2	3	-	-	-	1	-	-	-	-	-	-	1	1
CO5	3	1	-	-	-	1	-	-	-	-	-	1	2	2
CO (Avg)	2.60	1.80	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	2.00	1.80

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	AIRPORT PLANNING	9
Air transport characteristics – airport classification – aircraft characteristics-airport planning; objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection, Typical airport layouts, case studies, Parking and circulation area.		
UNIT II	**AIRPORT DESIGN**	**9**
Runway Design: Orientation, Wind Rose Diagram, Geometric Design –airport capacity - Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings - Holding aprons - location of terminal buildings - aircraft hangers.		
UNIT III	**TRAFFIC DESIGN**	**9**
Air traffic control- air traffic control aids: Enroute aids - landing aids. Airport Drainage: requirements and advantages - Airport marking and lighting of runways - taxiways and approach areas – heliports.		
UNIT IV	**HARBOUR PLANNING**	**9**
Selection of site-draft conditions - entrance and channel requirement- Harbour components–classification – Location - layouts - Ports-Difference between port and harbor -Construction of Port - operations- Dredging		
UNIT V	**COASTAL STRUCTURES**	**9**
Break waters – types-special blocks- tetrapod - hexapod - tribars. Jetties- wharves- piers - transit sheds-warehouses. Mooring - accessories - berthing facilities - dolphins. Docks - types - Navigational aids: buoys - lighthouses –anchors.		

Text Book (s)

1	Khanna.S.K, Arora.M.G, Jain.S.S, "Airport Planning and Design", Nem Chand Bros, Roorkee, 6th Edition, 2011.
2	Bindra.S.P, "Docks and Harbour Engineering", DhanpatRai Publications (P) Ltd, New Delhi, 2013.

Reference (s)

1	Subramanian.K.P, "Highways, Railways, Airport and Harbor Engineering", Scitech Publications (India) Chennai, 2010.
2	Robert M. Horonjeff, Francis X. Mckelvey Planning and Design of Airports, TMH publishers, 2010.
3	Venkatramaiah.C, Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels,Universities Press (India) Private Limited, Hyderabad,2015.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE002T	TRAFFIC ENGINEERING AND MANAGEMENT	3	0	0	3

Prerequisite Course (s)

Highway and Railway Engineering

Course Objective (s): The purpose of learning this course is to:

1	Plan for traffic systems by analyzing the problems
2	Describe the traffic surveys and traffic forecasting
3	Outline the design of traffic intersections and traffic signs
4	Impart knowledge on traffic safety
5	Learn about traffic management systems

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyze traffic problems and plan for traffic systems for various uses.
CO2	Understand the traffic surveys and traffic forecasting
CO3	Design traffic intersections and traffic signs
CO4	Plan for traffic safety and promote the integration of public transport system
CO5	Develop Traffic Management Systems

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	1	-	-	-	-	-	-	2	1
CO2	3	2	-	-	-	1	-	-	-	-	-	1	3	2
CO3	3	1	2	-	-	1	-	-	-	-	-	1	3	2
CO4	2	3	-	-	-	1	1	-	-	-	-	1	1	2
CO5	3	1	-	-	-	1	-	-	-	-	-	1	2	2
CO (Avg)	2.40	1.80	2.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.20	1.80

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	TRAFFIC PLANNING AND CHARACTERISTICS	9
Road Characteristics – Road user characteristics –Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Integrated planning of town, country, regional and all urban infrastructures – Towards Sustainable approach – Land use and transport and model integration.		
UNIT II	**TRAFFIC SURVEYS**	**9**
Traffic Surveys – Speed, journey time and delay surveys –Traffic density and prediction- Methods and interpretation – Origin Destination Survey – Methods– Parking Survey –Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.		
UNIT III	**TRAFFIC DESIGN**	**9**
Intersection Design - channelization, Rotary intersection design – Signal design – Coordination of signals – Grade separation - Traffic signs including VMS and road markings–HTMS - Significant roles of traffic control personnel - Networking pedestrian facilities and cycle tracks.		
UNIT IV	**TRAFFIC SAFETY AND ENVIRONMENT**	**9**
Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport.		
UNIT V	**TRAFFIC MANAGEMENT**	**9**
Area Traffic Management System - Traffic System Management (TSM) with IRC standards – Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods –Intelligent Transport System for traffic management, enforcement and education – Case Study.		

Text Book (s)

1	Kadiyali L R, "Traffic Engineering and Transport Planning", Khanna Publishers,2017

Reference (s)

1	ParthaChakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2011.
2	Roger P. Roess, Elena S. Prassas and William R. McShane, 'Traffic Engineering 3rd Edition", Pearson Education International, 2013.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE003T	URBAN PLANNING AND TRANSPORTATION	3	0	0	3

Prerequisite Course (s)

Highway Engineering

Course Objective (s): The purpose of learning this course is to:

1	Introduce the students about the regulations and laws related to Urban Planning.
2	Enable students to have the knowledge on planning process
3	Introduce the students to learn about development plans and formulation methods.
4	Give an overview about the urban project with respect to planning and its act
5	Know the urban transportation planning

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Describe basic issues in urban planning
CO2	Perform the skills to formulate plans for urban and rural development
CO3	Apply and analyse socio economic aspects of urban and rural planning
CO4	Prepare and design of urban development projects
CO5	Implementation of transportation planning in urban development projects

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO2	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO3	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO4	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO5	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	BASIC ISSUES	9
Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas - Trend of Urbanisation at International, National, Regional and State level.		
UNIT II	**PLANNING PROCESS**	**9**
Principles of Planning - Types and Level of Plan, Stages in Planning Process - Goals, Objectives, Delineation of Planning Areas, planning standards- the basic frame work-distribution of land use-developed area average densities.		
UNIT III	**DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION**	**9**
Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development , Control Rules, Transfer of Development Rights , Special Economic Zones - zoning regulations - density of population- sub divisions of regulation – floor area ratio.		
UNIT IV	**PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS**	**9**
Site Analysis, Layout Design, Planning Standards, Project Formulation - Evaluation, Plan, Implementation, Constraints and Implementation, Financing of Urban Development Projects, Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations.		
UNIT V	**TRANSPORTATION PLANNING**	**9**
Urban Transportation Planning - Goals and objectives - Hierarchical levels of transportation planning - Forecast - Implementation - Constraints. UTP survey - Inventory of land use Trip generation - Trip classification - productions and attractions - Multiple regression models - Category analysis - Trip production models - Trip distribution models - Linear programming approach.		

Text Book (s)	
1	Prakash M Apte, "Urban planning and Development: An Indian Perspective" Zorba Publishers, 2013.
2	Hiraskar G K "Fundamental of Town Planning" DhanpatRai Publications, 2012.
Reference (s)	
1	Rangwala.S.C. "Town Planning" Charotar Publishing House., Anand 2005.
2	National Building Code of India., SP7 (Group 1)Bureau of Indian Standards, New Delhi,2005
3	Urban planning, Theory and Practice, M.Pratap Rao

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE004T	REMOTE SENSING AND GIS APPLICATION FOR CIVIL ENGINEERING	3	0	0	3

Prerequisite Course (s)

Soil Mechanics

Course Objective (s): The purpose of learning this course is to:

1	Impart fundamental knowledge on concepts of Remote sensing
2	Impart knowledge applications leading to modelling of earth resources management using remote sensing
3	Impart the knowledge about the urban and transport management
4	Describe the importance of water resources planning using GIS
5	Elaborate the advance network analysis in GIS

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyse the principles and components of photogrammetric and remote sensing
CO2	Process of data acquisition of satellite images and their characteristics
CO3	Model soil characteristics, soil degradation assessment and management
CO4	Monitor urban growth and management of transport infrastructure
CO5	Model catchments and management of water resources

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO2	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO3	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO4	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO5	3	2	-	-	-	1	-	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO REMOTE SENSING	9
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan- Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts –typical spectral reflective characteristics of water, vegetation and soil(GPS)		
UNIT II	**PLATFORMS AND SENSORS**	**9**
Types of platforms – orbit types, Sun- synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors – Introduction to Drone Surveying		
UNIT III	**URBAN AND TRANSPORTATION MANAGEMENT**	**9**
Monitoring Urban Growth through Remote Sensing - Geo-demographic Analysis – Property Market Analysis Urban Renewal - traffic analysis - accident analysis - site suitability analysis for transport infrastructure –transportation databases: creation and maintenance - Vehicle routing – Highway maintenance system – Intelligent Transportation System		
UNIT IV	**WATER RESOURCES PLANNING AND MANAGEMENT**	**9**
Location of storage/diversion works – capacity curve generation – sediment yield - modelling of catchments – Delineation of watershed - Watershed modelling for sustainable development - Rainfall – Runoff modelling –LiDAR Mapping for Urban area –Water quality mapping and monitoring – Flood Risk Zoning - Flood damage assessment – Flood Modelling - Assessment of droughts and mitigation		
UNIT V	**NETWORK ANALYSIS**	**9**
Utility Network Analyst in ArcGIS - building water networks in ArcCatalog - performing network analyses- developing network connectivity rules-network validation and editing- Application of HEC-Geo RAS for ArcGIS to hydraulic modelling of floodplains (FEMA), real-time operations, and emergency management.		

Text Book (s)	
1	AnjiReddy.M "Textbook of Remote Sensing and Geographical Information Systems", Fifth Edition, BS Publication, 2012.
2	Albert K.W.Yeung,Lo.C.P.,"Concepts and Techniques of Geographic Information Systems", Second edition, PHI Learning Private Limited, Delhi, 2014.
Reference (s)	
1	Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley and Sons Inc,2004.
2	Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition, 2010.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE005T	SUSTAINABLE CONSTRUCTION METHODS	3	0	0	3

Prerequisite Course (s)

Construction Materials and Techniques

Course Objective (s): The purpose of learning this course is to:

1	Gaining knowledge of the key aspects of sustainable construction
2	Obtaining knowledge of the basic technologies used in sustainable construction
3	Acquiring the ability to rationally selecting energy-efficient ecological building materials for sustainable Construction
4	Understanding possible uses of different methods and tools for estimating the influence of buildings on the environment

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Know the principles and criteria of sustainable construction
CO2	Basic technologies and basic materials used in sustainable construction
CO3	Identify the suitable building materials for sustainable construction
CO4	Concept of Environment and Environmental Impact Factors considering for various projects
CO5	Get the aware of the energy efficient buildings concept

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	1	-	-	1	2	1
CO2	3	2	-	-	-	1	1	-	1	-	-	1	2	1
CO3	3	2	-	-	-	1	1	-	1	-	-	1	2	1
CO4	3	2	-	-	-	1	1	-	1	-	-	1	2	1
CO5	3	2	-	-	-	1	1	-	1	-	-	1	2	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Fundamentals of Sustainable Construction Engineering –Sustainability and resources, need, present practices at national and international level, The Sustainability Quadrant– challenges and Issues, Government initiatives - Necessity and importance of sustainable construction materials.		
UNIT II	**SUSTAINABLE MATERIALS**	**9**
Recycled and reused products in sustainable construction - Advanced and smart materials and technologies in sustainable construction–Types of building materials for energy-efficient construction: an overview - Building materials for thermal insulation (Mineral and natural based composites, polymers, advanced materials, reflective materials) - Criteria for the selection of building materials for energy-efficient construction.		
UNIT III	**CONSTRUCTION METHODS**	**9**
Construction of conventional framed structure with block work walls - Modular construction methods for repetitive works - Precast concrete construction methods - Identification of cutting edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential.		
UNIT IV	**ENERGY EFFICIENT CONSTRUCTION**	**9**
Concept of Environment and Environmental Impact Factors and area of consideration for Mega Projects such as Airports, Highways, Power Projects, Water Related Projects - 3E's Environmental Economics, Ethics and Ecology of sustainable development -Rules and regulations and Laws governing Energy Conservation in India and developed Nations.		
UNIT V	**SUSTAINABLE MATERIALS APPLICATION**	**9**
Examination of the current LEED for New Construction rating system, and case study analysis of highly successful recent "green construction projects" - Life Cycle Assessment (LCA) of building materials - Case studies of the application of sustainable building materials in energy efficient buildings.		

Text Book (s)

1	Charles J,Kibert "Sustainable Construction: Green building design and delivery", 4th Edition, 2017, Wiley India Pvt. Ltd.,
2	Amirtanshushukla, atul Sharma "Sustainability through Energy efficient buildings", 1st Edition, CRC press publisher, 2018.

Reference (s)

1	Godfrey Boyle, "Renewable Energy:Power for a Sustainable Future",Oxford University Press, 2004.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE006T	CONSTRUCTION EQUIPMENT AND AUTOMATION	3	0	0	3

Prerequisite Course (s)

Construction Materials and Practice

Course Objective (s): The purpose of learning this course is to:

1	Explain the significance of equipment management in construction
2	Estimate various cost components of equipment in relation to its life cycle.
3	Choose an appropriate equipment for a specific purpose
4	Understand the maintenance and safety procedure of equipment
5	Learn about the recent automation of equipment in construction

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Compute planning and management process in equipment's operation
CO2	Illustrate the types of equipment's and their process
CO3	Extend the other types of equipment's used in construction
CO4	Produce a maintenance and safety guidelines for equipment usage
CO5	Characterise the automations in construction equipment's

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	CONSTRUCTION EQUIPMENT AND MANAGEMENT	9
Identification – Planning of equipment – Selection of Equipment - Equipment Management in Projects – Equipment cost – Operating cost – Cost Control of Equipment - Depreciation Analysis – Replacement of Equipment		
UNIT II	**EQUIPMENT FOR EARTHWORK**	**9**
Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders – Dozer, Excavators, Rippers, Loaders, trucks and hauling equipment, Compacting Equipment, Finishing equipment.		
UNIT III	**OTHER CONSTRUCTION EQUIPMENT**	**9**
Equipment for Dredging, Trenching and Tunneling – Equipment for Drilling and Blasting – Pile driving Equipment - Erection Equipment - Crane, Mobile crane - Equipment for Demolition.		
UNIT IV	**MAINTENANCE AND SAFETY**	**9**
Need of Equipment Maintenance - Merits and Demerits of Maintenance - Maintenance Management - planned, unplanned, preventive, breakdown maintenance - Safety Management – Procedures		
UNIT V	**INDUSTRY AUTOMATION**	**9**
Needs and identified Areas in Construction for automation - Advantages of Automation in Construction Industry - Autonomous Machines - Drones to Survey in construction sites - Robotics in construction works – Application of IoT – Instrumentation Application – Virtual Reality and Augmented Reality.		

Text Book (s)	
1	Sharma S.C., "Construction Equipment and Management, Khanna Publishers, New Delhi, 2011.
2	Peurifoy, R. L., Schexnayder, C. J., Shapira, A., and Schmitt, R., "Construction planning, equipment, and methods", 8th ed., McGraw Hill, New York, 2010.
Reference (s)	
1	Gransberg, D.G., Popescu, C. M., and Ryan, R. C., "Construction equipment management for engineers, estimators, and owners", Taylor and Francis, New York, 2006.
2	Arora S.P. and Bindra.S.P., Building Construction, Planning Techniques and Method of Construction, DhanpatRai and Sons, 2010.

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE007T	QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION	3	0	0	3

Prerequisite Course (s)

Construction Materials and Practice

Course Objective (s): The purpose of learning this course is to:

1	Understand quality process and systems
2	Planning of quality methods and evaluation
3	Adopt the suitable quality procedure
4	Explain the different aspects of quality engineering
5	Study the improvement techniques in quality

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Enhance the Sequence the quality process
CO2	Augment the available quality systems
CO3	Outline the quality planning with codes and standards
CO4	Illustrate the different aspects of quality appraisal and factors
CO5	Explain the improvement techniques in quality

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO3	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO4	3	2	-	-	-	1	1	-	-	-	1	1	2	2
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Introduction – Definitions and objectives – Factor influencing construction quality - Responsibilities and authority - Quality plan - Quality Management Guidelines – Quality circles.		
UNIT II	**QUALITY SYSTEMS**	**9**
Introduction - Quality system standard – ISO 9000 family of standards – ISO documentation-Requirements – Preparing Quality System Documents – Quality related training – International Standards for Quality – Case study.		
UNIT III	**QUALITY PLANNING**	**9**
Quality Policy, Objectives and methods in Construction industry – Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection test plan -Inspection procedures – Site based quality plan.		
UNIT IV	**QUALITY ASSURANCE AND CONTROL**	**9**
Objectives - Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality -Appraisals, Factors influencing construction quality.		
UNIT V	**QUALITY IMPROVEMENT TECHNIQUES**	**9**
Selection of new materials - Influence of drawings, detailing, specification, and standardization – Bid preparation - Construction activity- environmental safety - social and environmental factors.		

Text Book (s)

1	Kulkarni A. K. Bewoor V. A, Quality Control, Wiley India Pvt. Ltd, 2009.
2	Bagad.V.S., Total Quality Management, Technical Publishers, 2nd Edition, 2019

Reference (s)

1	James, J.O' Brian, Construction Inspection Handbook – Quality Assurance and Quality Control, Van No strand, New York, 2009.
2	Kwaku, A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., Virginia, 2005.
3	Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, Tata McGraw Hill, 2003
4	Clarkson H. Oglesby, Productivity Improvement in Construction, McGraw-Hill, 2009.

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE008T	PROJECT SAFETY MANAGEMENT	3	0	0	3

Prerequisite Course (s)

Construction Engineering and Management

Course Objective (s): The purpose of learning this course is to:

1	Prepare the students to be industry expectations in safety management
2	Study the elements of safety management
3	Be exposed to means of safety management in construction industry
4	Conduct research to develop advanced technologies and tools in safety management approaches.
5	Enhance the students knowledge on real time projects

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Develop the knowledge on accidents and their causes.
CO2	Develop the knowledge about safety programmes and safety assessments.
CO3	Apply the knowledge contractual obligations.
CO4	Explain about designing for safety procedures.
CO5	Develop the information on owner's responsibility.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	-	-	-	-	1	1	2	1
CO2	3	2	-	-	-	1	-	-	1	-	1	1	2	1
CO3	3	2	-	-	-	1	-	-	-	-	1	1	2	1
CO4	3	2	-	-	-	1	-	-	1	-	1	1	2	1
CO5	3	2	-	-	-	1	-	-	-	-	1	1	2	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	CONSTRUCTION ACCIDENTS	9
Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications.		
UNIT II	**SAFETY IN CONSTRUCTION OPERATIONS**	**9**
Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction-Prevention of accidents-Safety measures-Safety in use of construction equipment -Safety of scaffolding and working platforms		
UNIT III	**CONTRACTUAL OBLIGATIONS**	**9**
Safety in Construction Contracts – Substance Abuse – Safety Record Keeping.		
UNIT IV	**DESIGNING FOR SAFETY**	**9**
Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers– Top Management Practices, Company Activities and Safety – Safety Personnel – Sub contractual Obligation – Project Coordination and Safety Procedures – Workers Compensation		
UNIT V	**OWNERS' AND DESIGNERS' OUTLOOK**	**9**
Owner's responsibility for safely – Owner preparedness – Role of designer in ensuring safety –Safety clause in design document-First aid on site.		

Text Book (s)

1	Bhattacharjee.S.K, Safety Management in Construction (Principles and Practice), Khanna Publishers, January 2011.
2	Ramakrishna,Kamaraju, Essentials of Project Management, January 2010

Reference (s)

1	Patrick X.W. Zou,RizaYosiaSunindijo, Strategic Safety Management in Construction and Engineering John Wiley and Sons, Ltd., 2015.
2	Jimmie W. Hinze, Construction Safety, Prentice Hall Inc., 1997.
3	Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE009T	HYDROLOGY	3	0	0	3

Prerequisite Course (s)

Fluid Mechanics and Hydraulic Machinery

Course Objective (s): The purpose of learning this course is to:

1	Understand all the components of the hydrological cycle.
2	Study the concept of mechanics of rainfall, its spatial and temporal measurement and their applications.
3	Understand the different types of simple statistical analysis and application of probability distribution of rainfall and run off.
4	Learn the concepts of simple methods of flood routing.
5	Understand the concepts of ground water hydrology.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Measure the rainfall intensity, duration and frequency.
CO2	Measure probable maximum precipitation.
CO3	Prepare the unit hydrograph for surface runoff.
CO4	Solve the flood routine and channel routine problems.
CO5	Understand the concept and methods of ground water management.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO2	3	2	-	-	-	-	1	-	-	-	-	1	1	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PRECIPITATION	9
Hydrologic cycle – Types of precipitation- Forms of precipitation- Measurement of Rainfall- Calculation of missing rainfall data– Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship- Probable maximum precipitation.		
UNIT II	**ABSTRACTION FROM PRECIPITATION**	**9**
Losses from precipitation – Evaporation process- reservoir evaporation- Infiltration process- Infiltration capacity – Measurement of infiltration- Infiltration indices- Effective rainfall		
UNIT III	**HYDROGRAPHS**	**9**
Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – 'S'curve hydrograph – Unit hydrograph of different deviations – Synthetic Unit Hydrograph		
UNIT IV	**FLOODS AND FLOOD ROUTING**	**9**
Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing- Muskingum's Channel Routing – Flood control – Mitigation methods		
UNIT V	**GROUND WATER HYDROLOGY**	**9**
Types of aquifers- Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer- Recuperation test – Transmissibility – Specific capacity – Pumping Test – Steady flow analysis only.		

Text Book (s)

1	Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2000.
2	Raghunath H.M." Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.

Reference (s)

1	Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.
2	David Keith Todd. "Groundwater Hydrology", John Wiley and Sons, Inc. 2007

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE010T	GROUND IMPROVEMENT TECHNIQUES	3	0	0	3

Prerequisite Course (s)

Soil Mechanics, Foundation Engineering

Course Objective (s): The purpose of learning this course is to:

1	Get exposed to various methods of dewatering techniques
2	Be familiar with compaction methods and influencing factors
3	Understand about consolidation and vertical drains
4	Distribute Knowledge about various stabilization techniques and its applications
5	Learn various strengthening materials and techniques of soil

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Choose the suitable dewatering techniques
CO2	Identify the soil and select suitable compaction method
CO3	Monitor consolidation of soil
CO4	Apply suitable techniques for improving the soil properties in the field
CO5	Use various types of techniques to strengthen the soil

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	DEWATERING	9
Introduction – Ground improvement – scope – necessity – New Technologies – Basic concepts – drainage methods – ground water lowering by well points – Deep well – Vacuum and electro–osmosis methods.		
UNIT II	**COMPACTION**	**9**
Introduction – compaction mechanics – field procedure – Surface compaction – selection – compaction quality control – Vibration methods – vibro-compaction, blasting, vibratory probe, vibratory compactors – vibro-displacement compaction – displacement piles – vibroflotation – Sand compaction piles – stone columns – heavy tamping. – Improvement of Safe Bearing Capacity.		
UNIT III	**CONSOLIDATION AND VERTICAL DRAINS**	**9**
Introduction – compressibility of soil and consolidation – preloading and surcharge fills – monitoring of compression – vertical drains – principle, design, types, construction, efficiency and applications.		
UNIT IV	**SOIL STABILIZATION**	**9**
Introduction – Stabilization methods – mechanical stabilization, chemical stabilization-cement, lime, bitumen – electrical stabilization – stabilization of expansive clays – Prewetting.		
UNIT V	**GEOSYNTHETICS AND TESTING METHODS**	**9**
Types of Geo-synthetics like Geo-textiles, Geo-grids, Geo-nets, Geo-cells, Geo-composites - Techniques for testing of different index properties, strength properties, Apparent Opening Size, In-plane and cross-plane permeability test - Assessment of construction induced damage - Extrapolation of long term strength properties from short term tests.		

Text Book (s)

1	Klaus Kirsch and Alan Bell "Ground improvement" Taylor and Francis Group, 2013.
2	Raison.C.A, "Ground and Soil Improvement" Thomas Telford Publishing, London, 2004.

Reference (s)

1	Purushothama Raj, P., "Ground Improvement Techniques", Laxmi Publications (P) Ltd., New Delhi, 2005.
2	Mittal.S, "An Introduction to Ground Improvement Engineering", Medtech Publisher, 2013.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE011T	INTEGRATED WATER RESOURCE MANAGEMENT	3	0	0	3

Prerequisite Course (s)

Soil Mechanics

Course Objective (s): The purpose of learning this course is to:

1	Impart fundamental knowledge on local and global perceptions
2	Develop the ability among the students to approaches on integrated water resource management
3	Describe the water supply and health impact on human
4	Provide fundamental knowledge of agricultural activities and economics
5	Provide the knowledge legal and regulation setting dealing with water resources problems

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Gain knowledge on various processes involved in participatory water resource management.
CO2	Understand famers participation in water resources management.
CO3	Aware of the issues related to water conservation and watershed Development
CO4	The students will gain knowledge about economic aspects of water
CO5	They will gain a broad understanding of the complexities of dealing with water resources problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	-	-	-	-	-	1	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	1	1	-
CO3	3	2	1	-	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	-	-	1	-	-	-	-	-	1	1	-
CO5	3	2	1	-	-	-	-	-	-	-	-	1	1	-
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	CONTEXT FOR IWRM	9
Water as a global issue: key challenges and needs – Definition of IWRM within the broader context of development – Complexity of the IWRM process – Examining the key elements of IWRM process.		
UNIT II	**WATER ECONOMICS**	**9**
Economic view of water issues: economic characteristics of water good and services – Nonmarket monetary valuation methods – Water economic instruments, policy options for water conservation and sustainable use– World conflicts–Case studies.		
UNIT III	**WATER SUPPLY AND HEALTH WITHIN THE IWRM CONSIDERATION**	**9**
Links between water and human health: options to include water management interventions for health – Health protection and promotion in the context of IWRM – Health impact assessment of water resources development.		
UNIT IV	**AGRICULTURE IN THE CONCEPT OF IWRM**	**9**
Water for food production: 'blueversusgreen' water debate – Virtual water trade for achieving global water security – Irrigation efficiencies, irrigation methods and current water pricing.		
UNIT V	**WATER LEGAL AND REGULATORY SETTINGS**	**9**
Basic notion of law and governance: principles of international and national law in the area of water management. Understanding UN law on non-navigable uses of international water courses – Development of IWRM in line with legal and regulatory framework.		

Text Book (s)

1	Cech Thomas V., Principles of water resources: history, development, management and policy. John Wiley and Sons Inc., New York. 2003.
2	Dalte, S.J.C., Soil Conservation and Land Management, International Book Distribution, India, 1986.

Reference (s)

1	Cech Thomas V., Principles of Water Resources: History, Development, Management and Policy. John Wiley and Sons Inc., New York. 2003.
2	Murthy, J.V.S., Watershed Management in India, Wiley Eastern Ltd., New York, 1995.
3	Mollinga P. et al. Integrated Water Resources Management, Water in South Asia Volume I, Sage Publications, 2006.

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE012T	SOLID AND HAZARDOUS WASTE MANAGEMENT	3	0	0	3

Prerequisite Course (s)

Environmental Science and Engineering

Course Objective (s): The purpose of learning this course is to:

1	Understand the sources, types and effects of solid waste.
2	Know about the storage containers and processing techniques for municipal solid waste.
3	Ability to identify collection options for municipal solid waste and transfer process.
4	Impart Knowledge on possible solutions to reuse and to develop the disposal alternative methods through case studies
5	Know about the classification of hazardous wastes and its storage and disposal options.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Summarize the characteristics of solid waste and the effects of solid waste public and economic aspects
CO2	Identify the storage containers and processing techniques for municipal solid waste.
CO3	Explain how to identify collection options for municipal solid waste and transfer process.
CO4	Illustrate the possible solution to reuse and energy management. To Develop the disposal alternative methods through case studies and team-oriented technical presentations.
CO5	Identify and Classify the hazardous waste and know about storage and disposal options for hazardous wastes.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	FUNDAMENTALS OF SOLID WASTE MANAGEMENT	9
Sources and types of solid wastes - Quantity - factors affecting generation of solid wastes; characteristics - methods of sampling and characterization; Effects of improper disposal of solid wastes - public health effects. Principle of solid waste management - social and economic aspects; Public awareness; Role of NGOs; Legislation.		
UNIT II	**ONSITE STORAGE ANDPROCESSING**	**9**
On-site storage methods - Effect of storage, materials used for containers- segregation of solid wastes - Public health and economic aspects of open storage - waste segregation and storage-case studies under Indian conditions- source reduction of waste - Reduction, Reuse and Recycling.		
UNIT III	**COLLECTION ANDTRANSFER**	**9**
Methods of Collection - analysis of collection system (HCS and SCS) - types of vehicles - Manpower requirement - collection routes - route optimization - preparation of master schedule - transfer stations - selection of location, operation and maintenance; options under Indian conditions.		
UNIT IV	**OFFSITE PROCESSING ANDDISPOSAL**	**9**
Processing techniques and Equipment; Resource recovery from solid wastes - sorting and separation - composting, incineration, Pyrolysis - options under Indian conditions- Dumping of solid waste; sanitary landfills - site selection, design and operation of sanitary landfills - Leachate collection and treatment.		
UNIT V	**HAZARDOUS WASTES**	**9**
Identification, classification of Hazardous waste-Source and characterization of hazardous waste – TCLP tests-Storage, labelling and handling of hazardous wastes-Hazardous waste manifests and transport-Waste minimization options-Disposal of Hazardous waste		

Text Book (s)

1	Ganesaguru.S, "Municipal Solid Waste Management" AR publications, 2016.
2	Rao, M. N., et al. Solid and Hazardous waste management. BS Pubications, 2014.

Reference (s)

1	Government of India, "Manual on Municipal Solid Waste Management", CPHEEO, Ministry of Urban Development, New Delhi, 2000.
2	George Tchobanoglous and Frank Kreith" Handbook of Solid Waste Management", McGraw Hill, New York, 2002.
3	Bhide A.D. and Sundaresan, B.B. "Solid Waste Management Collection", Processing and Disposal, 2001.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE013T	AIR AND NOISE POLLUTION AND CONTROL	3	0	0	3

Prerequisite Course (s)

Environmental Science and Engineering

Course Objective (s): The purpose of learning this course is to:

1	Impart knowledge on the concepts of air pollution and its effects on human and ecosystem health.
2	Understand the atmospheric process and pollutant transport mechanism.
3	Get Solution to control the major air pollution.
4	Apply modelling techniques and to determine the fate of air pollutant with respect to time and space.
5	Acquire the Knowledge of noise pollution and its control.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Relate the basic concepts of air pollution and its effects on human and ecosystem health.
CO2	Adopt interpretation of meteorological data for atmospheric stability and sampling of air pollutants
CO3	Find the major air pollution control technologies
CO4	Compute modelling techniques and to determine the fate of air pollutant with respect to time and space
CO5	Analyse the effects of noise pollution and its control.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO2	3	2	-	-	-	1	1	-	-	-	-	1	1	-
CO3	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Classification of air pollutants - Particulates and gaseous pollutants - Sources of air pollution - Effects of air pollution on human beings, materials, vegetation, animals - Air pollution indices - Indoor Air Pollutants		
UNIT II	**METEOROLOGY**	**9**
Elements of atmosphere - Meteorological factors - Wind roses - Lapse rate - Atmospheric stability and turbulence - Plume rise - Dispersion of pollutants - Gaussian plume Dispersion models - Applications.		
UNIT III	**CONTROL OF PARTICULATE ANDGASEOUS CONTAMINANTS**	**9**
Concepts of control - Principles of control measures - Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation - Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion -Pollution control for specific major industries.		
UNIT IV	**AIR QUALITY SAMPLING AND MODELLING**	**9**
Stack sampling- instrumentation and methods of analysis of gases- Analytical methods-Air pollution legislation and regulations- Legal Requirements based on Tamil Nadu – Impact of Novel Corona Virus 2019 - Case Studies.		
UNIT V	**NOISE POLLUTION ANDCONTROL**	**9**
Sources and Effects of Noise Pollution – Measurement – Standards – Control and Preventive measures – Case Studies.		

Text Book (s)	
1	Rao .C.S, Environmental pollution control engineering, New Age International, 2007.
2	Rao M N and Rao H V N., Air Pollution, McGraw Hill Education(India) Private Limited., New Delhi, 2016.
Reference (s)	
1	Lawrence K.Wang, Norman C Pereira, Yung-Tse-Hung, 'Air Pollution Control Engineering', Springer, 2004.
2	De Nevers, Noel. Air pollution control engineering. Waveland press, 2010.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE014T	INDUSTRIAL WASTE MANAGEMENT	3	0	0	3

Prerequisite Course (s)

Environmental Science and Engineering

Course Objective (s): The purpose of learning this course is to:

1	Know about the Characteristics, Effects and Environmental Legislation of Industrial wastes.
2	Ability to plan minimization of industrial wastes
3	Ability to design facilities for the processing and reclamation of industrial waste water
4	Impart knowledge on the Treatment Technologies in Industrial.
5	Know about the classification of hazardous wastes and its storage and disposal options.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Infer the characteristics of Industrial Waste and their impact at the surroundings.
CO2	Summarize cleaner production techniques for reuse, recycle and recovery
CO3	Analyse the characteristics of wastewater from major Industries and their reclamation concept
CO4	Recognize the appropriate treatment and disposal method based on the characteristics of Wastewater.
CO5	Specify Hazardous waste and identify suitable treatment techniques

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	1	1	-	-	-	-	1	1	-
CO2	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	1	-
CO4	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION	9
Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes		
UNIT II	**CLEANER PRODUCTION**	**9**
Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and by-product recovery – Applications.		
UNIT III	**POLLUTION FROM MAJOR INDUSTRIES**	**9**
Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts.		
UNIT IV	**TREATMENT TECHNOLOGIES**	**9**
Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal.		
UNIT V	**HAZARDOUS WASTE MANAGEMENT**	**9**
Hazardous wastes-Sources and Classification- Collection and Segregation - Physical chemical treatment – solidification – incineration – Secure landfills- Regulatory aspects – Control measures		

Text Book (s)

1	Rao, M. N. Waste water treatment. Oxford and IBH Publishing, 2018.
2	Patwardhan. A.D., Industrial Wastewater Treatment", Prentice Hall of India, New Delhi 2010.
3	Eckenfelder W.W. Jr., "Industrial Water Pollution Control", McGraw Hill Book Company, New Delhi, 2000.

Reference (s)

1	Stephenson, Ralph L., and James B. Blackburn Jr. The industrial wastewater systems handbook. CRC Press, 2018.
2	Freeman H.M., "Industrial Pollution Prevention Hand Book", McGraw Hill Inc., New Delhi, 1995.
3	Bishop, P.L., "Pollution Prevention: Fundamental and Practice", McGraw Hill, 2000.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE015T	REPAIR AND REHABILITATION OF CONCRETE STRUCTURES	3	0	0	3

Prerequisite Course (s)

Concrete Technology, Design of Steel Structures

Course Objective (s): The purpose of learning this course is to:

1	Study the reasons of crack formations.
2	Identify the formation of moisture in the structures.
3	Recognize deterioration of concrete buildings.
4	Know Deficiencies in various forms of steel constructions.
5	Aware of Strengthening techniques for prevailing structures.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the various patterns of cracks for different failure.
CO2	Restrict moisture movement internally and externally.
CO3	Select suitable Repair techniques for different deterioration.
CO4	Pick right techniques to eliminate distressing in steel arrangements.
CO5	Comparison of verities of rehabilitation techniques according to requirement.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	2
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	BUILDING CRACKS	9
Causes – Diagnosis – Remedial measures – Thermal and Shrinkage cracks – Unequal loading – Vegetation and trees – Chemical action – Foundation movements – Techniques for repair - Repair materials		
UNIT II	**EFFECT OF MOISTURE CONTENT IN STRUCTURES**	**9**
Sources of dampness – Moisture movement from ground – Reasons for ineffective DPC – Roof leakage – Pitched roofs — Leakage of Concrete slabs – Condensation – Hygroscopic salts- Remedial treatments – Ferro cement overlay.		
UNIT III	**CONCRETE STRUCTURES**	**9**
Introduction – Causes of deterioration – Diagnosis of causes – Flow charts for diagnosis – Methods of repair – Repairing spalling and disintegration – Repairing of concrete floors and pavements.		
UNIT IV	**STEEL STRUCTURES**	**9**
Types and causes for deterioration – Preventive measures – Repair procedure – Brittle fracture – Lamellar tearing – Defects in welded joints – Mechanism of corrosion –protect against corrosion – Distress during erection.		
UNIT V	**STRENGTHENING OF EXISTING STRUCTURES**	**9**
General principles – Relieving loads – Strengthening super structures – Plating – Conversion to composite construction – Post stressing – Jacketing – Bonded overlays - Reinforcement addition – Strengthening substructures – Under pinning – Increasing load capacity of footing – Design for rehabilitation.		

Text Book (s)

1	Vidivelli.B Rehabilitation of Concrete Structures Standard Publishes Distribution.1st edition 2012.
2	Guha, P.K, "Maintenance and Repairs of Buildings", New Central Book Agency (P) Ltd, Calcutta, 2011.

Reference (s)

1	Macdonald, S, "Concrete - Building Pathology", Blackwell Science Limited, Oxford, 2013
2	Dodge Woodson.R Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann, Elsevier, New Delhi 2012
3	Varghese.P.C Maintenance Repair and Rehabilitation and Minor works of building, Prentice Hall India Pvt Ltd 2014.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE016T	PREFABRICATED STRUCTURES	3	0	0	3

Prerequisite Course (s)

Construction Materials and Techniques, Concrete Technology

Course Objective (s): The purpose of learning this course is to:

1	Impart knowledge to students on modular construction and prefabricated components.
2	Understand the various elements of prefabrication
3	Impart knowledge to students on various production methods of prefabricated components.
4	Distinguish the various methods involved in erection processes
5	Impart knowledge on the applications of prefabricated elements in construction

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the general principles of fabrication
CO2	Design of simple rectangular beams and I beams
CO3	Understand the procedure of production technology
CO4	Demonstrate the suitable techniques for erection of different types of members like beams, slabs, wall panels and columns
CO5	Acquire knowledge on the application of prefabrication techniques

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO2	3	2	1	-	-	1	-	-	-	-	-	1	2	1
CO3	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	GENERAL PRINCIPLES OF FABRICATION	9
Comparison with monolithic construction - Types of prefabrication - site and plant prefabrication - Economy of prefabrication - Modular coordination - Standardization - Planning for Components of prefabricated structures - Disuniting of structures - Handling and erection stresses - Elimination of erection stresses - Beams, columns - Symmetrical frames		
UNIT II	**PREFABRICATED ELEMENTS**	**9**
Introduction of elements: Roof and floor panels, ribbed floor panels, wall panels, footings - Joints for different structural connections - Effective sealing of joints for water proofing - Provisions for non-structural fastenings – Designing and detailing of simple precast unit (Beam and Slab only)		
UNIT III	**PRODUCTION TECHNOLOGY**	**9**
Choice of production setup - Manufacturing methods - Stationary and mobile production - Planning of production setup - Storage of precast elements - Dimensional tolerances.		
UNIT IV	**HOISTING TECHNOLOGY**	**9**
Equipment's for hoisting and erection - Techniques for erection of different types of members like Beams, Slabs, Wall panels and Columns.		
UNIT V	**APPLICATIONS**	**9**
Application in residential, commercial and industry projects - Utilization of Prefabricated elements in highway sector – Real time application with case study.		

Text Book (s)

1	Mokk.L, Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian Academy of Sciences, Budapest, 2007.
2	Dr.Ganesan, Prefabricated structures, Sree Kamalamani Publication, 2020.

Reference (s)

1	Koncz.T, Manual of Precast Concrete Construction, Vol. I, II, III and IV, Berlin, 1988.
2	Lewicki.B, Building with Large Prefabricates, Elsevier Publishing Company, Amsterdam, London, New York, 1998.
3	Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the use of Precast Concrete, Netherland Betor Verlag, 2009.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE017T	ADVANCED DESIGN OF CONCRETE STRUCTURES	3	0	0	3

Prerequisite Course (s)

Design of Reinforced Concrete Structures

Course Objective (s): The purpose of learning this course is to:

1	Study the concept of design of retaining walls.
2	Learn the design of water retaining structures.
3	Understand the design concept of bunkers and silos
4	Study the concept of design of flat slab and grid slab.
5	Understand the concepts of design of RC walls, deep beams and Chimney

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Design the Cantilever and Counter fort retaining walls.
CO2	Design the staging, foundations and other parts of water retaining structures.
CO3	Design of Concrete Bunkers and Silos
CO4	Design the flat slab and grid slab based on their provisions
CO5	Design of RC wall , Deep Beam and Concrete Chimney

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	1	-	-	-	-	1	1	1
CO2	3	2	1	1	-	1	1	-	-	-	-	1	1	1
CO3	3	2	1	1	-	1	1	-	-	-	-	1	1	1
CO4	3	2	1	1	-	1	1	-	-	-	-	1	1	1
CO5	3	2	1	1	-	1	1	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	**RETAINING WALLS**	**9**
Retaining walls – Types – Earth Pressure – Effects of surcharge – Stability requirements – Design of Cantilever type retaining wall and counter fort type retaining wall – Detailing of reinforcement.		
UNIT II	**WATER TANKS**	**9**
Introduction – Types of water tanks – Tanks resting on ground – Underground water tanks – Overhead tanks – ring beam, staging and foundation.		
UNIT III	**CONCRETE BUNKERS AND SILOS**	**9**
Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.		
UNIT IV	**DESIGN OF FLAT AND GRID SLAB**	**9**
Flat Slab – Types – Direct design method - Design of flat slab –Grid slab - Design of grid slab.		
UNIT V	**MISCELLANEOUS TOPICS**	**9**
Design of RC walls - Design of Deep beams- Design of Concrete Chimney		
Textbook (s)		
1	Krishna Raju. N, "Design of Reinforced Concrete Structures", CBS Publishers and Dist, New Delhi, 2013.	
2	Dr.Subrmaniam. N, "Design of Reinforced Concrete Structures", Oxford Publications, 2013.	
Reference (s)		
1	Unnikrishna Pillai. S, Devdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2009.	
2	Vargheese P.C., "Limit state design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2002.	

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE018T	ADVANCED DESIGN OF STEEL STRUCTURES	3	0	0	3

Prerequisite Course (s)

Design Steel Structures

Course Objective (s): The purpose of learning this course is to:

1	Describe on types and design of chimneys
2	Develop knowledge on design of water tanks
3	Gather information on design of light gauge steel structures
4	Study the concepts of steel bunkers and silos
5	Learn the concepts of Composite structural Components

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyse and design chimneys.
CO2	Design circular and rectangular water tanks.
CO3	Design compression and tension members in light gauge sections.
CO4	Apply the concepts of steel bunkers and silos.
CO5	Design of Composite structural Components

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	-	-	-	-	-	1	1	1
CO2	3	2	1	1	-	1	-	-	-	-	-	1	1	1
CO3	3	2	1	1	-	1	-	-	-	-	-	1	1	1
CO4	3	2	1	1	-	1	-	-	-	-	-	1	1	1
CO5	3	2	1	1	-	1	-	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	STEEL CHIMNEYS	9
Design of chimneys –Self supporting type – Guyed type at single level – foundation for chimneys.		
UNIT II	**STEEL WATER TANKS**	**9**
Introduction – loads acting on water tanks – types of water tanks – Design of circular and rectangular water tanks– Pressed Steel Water Tanks		
UNIT III	**LIGHT GAUGE STRUCTURES**	**9**
Design of light gauge steel members – local and post buckling of thin element – light gauge steel compression members – tension members.		
UNIT IV	**DESIGN OF STEEL BUNKERS AND SILOS**	**9**
Introduction- Janseen's Theory–Airy's Theory- Design of Parameters – Design Criteria – Analysis of Bins– Hopper Bottom– Design of Bins.		
UNIT V	**DESIGN OF COMPOSITE STRUCTURE**	**9**
Floor and Roof system Design – Non-Composite Beam – Composite Beam – Serviceability Requirement		

Text Book (s)

1	Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.
2	Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2014

Reference (s)

1	Ramachandra, "Design of Steel Structures", Vol. I and II, Standard publishers Distributors, NewDelhi, 2010
2	Negi.L.S, Design of Steel Structures, McGraw Hill Education, 2017.

Code Book (s)

1	IS 800:2007 General constructions in steel - Code of practice, BIS, New Delhi.
2	IS 875:1987 Part I, II, III, IV, V - Code of practice for design loads (other than Earth Quake) for buildings and structures, BIS, New Delhi.
3	IS 801:1975 (R2001) - Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members In General Building Construction, BIS, New Delhi.
4	IS 6533(Part 2):1989 - Code of practice for Design and Construction of Steel Chimneys, BIS, New Delhi.
5	IS 805:1968 - Code of Practice for Use of Steel in Gravity Water Tanks, BIS, New Delhi.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE019T	BASICS OF DYNAMICS AND ASEISMICDESIGN	3	0	0	3

Prerequisite Course (s)

Engineering Mechanics

Course Objective (s): The purpose of learning this course is to:

1	Impart knowledge on the theory of vibration and basics of structural dynamics
2	Understand the concepts of earthquake and seismology
3	Impart the design philosophy of earthquake resistant design of structures
4	Create awareness on the use of codal provisions for aseismic design of structures
5	Apply the concepts of retrofitting and repair techniques in a structure after an earthquake

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the principles of vibration and degrees of freedom.
CO2	Summarize the phenomenon, causes and measurement of earthquakes.
CO3	Identify the codal provisions for design of structures.
CO4	Apply the design considerations in ductile detailing.
CO5	Identify the importance of structural integrity of a masonry structure.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO VIBRATION AND DAMPING	9
Vibration Analysis of structures - Simple Harmonic motion- Vibration with and without damping - D' Alembert's principle - Degree of freedom: Equation of motion for S.D.O.F. - Damped and undamped free vibrations - Undamped forced vibration		
UNIT II	**INTRODUCTION TO EARTHQUAKE ENGINEERING**	**9**
Plate Tectonics - Causes of earthquakes- Elements of engineering seismology - Seismic waves - Magnitude – Intensity and Energy release -Earthquake measuring Instruments - Indian seismology - Earthquake history - Lessons learnt from past earthquakes - Seismic zone map of India - Strong motion characteristics		
UNIT III	**ASEISMIC DESIGN OF BUILDINGS**	**9**
Idealization of building frames - Introduction to methods of seismic analysis - Equivalent static analysis - IS 1893 provisions - Design horizontal seismic coefficient - Design base shear distribution - Seismic resistant design of buildings		
UNIT IV	**EARTHQUAKE RESISTANT CONSTRUCTION**	**9**
Earthquake resistant properties of materials - Lateral force resisting systems - Strong column weak beam - Guidelines for seismic resistant construction - Building configuration requirements - Ductile detailing of reinforcements in RC buildings - Behaviour and design of masonry structures		
UNIT V	**REPAIRS AND RETROFITTING**	**9**
Code of practices for repairs and retrofitting - Retrofitting of RC buildings and structural elements - Techniques of retrofitting - Improving structural integrity of masonry buildings - Retrofitting by seismic isolation - Case studies		

Text Book (s)

1	Mario Paz, Structural Dynamics - Theory and Computation, CBS Publications, 2004.
2	Pankaj Agarwal and Manish Shrikhande, Earthquake Resistant Design of Structures, Prentice Hall of India, 2006.

Reference (s)

1	Duggal .S.K, Earthquake Resistant Design of Structures, Oxford University Press, 2013
2	Damodarasamy,S.R., Kavitha,S. "Basics of Structural Dynamics and Aseismic Design", PHI Publishers, New Delhi, 2016
3	Varghese.P.C, Maintenance, Repair & Rehabilitation and Minor Works of Buildings, Prentice Hall India Learning Private Limited, 2014

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Code Book (s)	
1	IS 1893 - 2002, Criteria for Earthquake Resistant Design of Structures
2	IS 4326 - 1993, Earthquake Resistant Design and Construction of Buildings - Code of Practice
3	IS 13920 - 1993, Ductile Detailing of Reinforced Concrete Structures to Seismic Forces Code of Practice
4	IS 13935 - 1993, Repair and Seismic Strengthening of Buildings - Guidelines

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16 OCT 2020
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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE020T	PRESTRESSED CONCRETE STRUCTURES	3	0	0	3

Prerequisite Course (s)

Design of Reinforced Concrete Structures

Course Objective (s): The purpose of learning this course is to:

1	Learn the principles, materials, methods and systems of prestressing.
2	Know the different types of losses and deflection of prestressed members.
3	Understand the concept of circular prestressing.
4	Calculate ultimate flexural strength of beam.
5	Learn the design of prestressed bridges.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the concepts and materials used in prestressed concrete.
CO2	Evaluate the various losses occurring due to Pre-tensioning and Post-tensioning.
CO3	Design the Prestressed Concrete tanks, Sleepers and Poles.
CO4	Design the Prestressed Concrete structure for Flexure.
CO5	Design the Prestressed Concrete Bridges.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Basic concepts - Materials used- Advantages of Prestressed Concrete - Applications of Prestressed Concrete -High Strength Concrete - strength requirements permissible stresses in concrete - Creep and Shrinkage - Deformation characteristics – High strength steel - strength requirements - permissible stress in steel.		
UNIT II	**PRESTRESSING SYSTEMS AND LOSS OF PRESTRESS**	**9**
Introduction– Pre-tensioning systems -Post-tensioning systems - Chemical prestressing -Nature of losses -Different types of losses and their assessment – Design of post-tensioned slab		
UNIT III	**CIRCULAR PRESTRESSING**	**9**
Design of Prestressed concrete tanks – Poles and Sleepers.		
UNIT IV	**DESIGN OF PRESTRESSED CONCRETE SECTIONS**	**9**
Design of section for Flexure - Axial tension, compression and bending - Shear, Bond and Torsion.		
UNIT V	**PRESTRESSED CONCRETE BRIDGES**	**9**
General aspects of Pretensioned Prestressed Bridge Decks – Post-tensioned Prestressed Bridge Decks - Advantages over R.C.bridges - Principles of design only.		

Textbook (s)	
1	Krishna Raju N. "Prestressed concrete", Tata McGraw Hill Company, fifth edition, 2012.
2	Dayaratnam.P., Sarah P, Prestressed Concrete Structures, Seventh Edition, Oxford and IBH, 2017.
Reference (s)	
1	Sinha.N.C. And Roy.S.K. Fundamentals of Prestressed Concrete, S.Chand and Co. Ltd.,2011.
2	Rajagopalan.N, Prestressed Concrete, Narosa Publishing House, 2002.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE021T	BRIDGE STRUCTURES	3	0	0	3

Prerequisite Course (s)

Design of Steel Structures, Foundation Engineering, Design of Reinforced Concrete Structures, Prestressed Concrete Structures

Course Objective (s): The purpose of learning this course is to:

1	Know about various bridge structures, selection of appropriate bridge structures and design it for given site conditions.
2	Introduce the design of reinforced concrete Tee beam and slab bridge decks, plate girder bridges
3	Introduce the design of reinforced concrete slab bridge decks, Tee beam and slab bridge decks.
4	Impact knowledge on the design of different types of bridge bearings, piers and abutments, and bridge foundations
5	Introduce the design and prestressed concrete bridges

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Importance bridge components
CO2	Design various types of plate girder bridges.
CO3	Design of through type and deck type steel highway bridges.
CO4	Design various types of RC slab bridges for IRC loading.
CO5	Design prestressed concrete bridges.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	1	-	-	-	-	1	1	1
CO2	3	2	1	-	-	1	1	-	-	-	-	1	1	1
CO3	3	2	1	-	-	1	1	-	-	-	-	1	1	1
CO4	3	2	1	-	-	1	1	-	-	-	-	1	1	1
CO5	3	2	1	-	-	1	1	-	-	-	-	1	1	1
CO (Avg)	3.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO BRIDGE AND LOADS ON BRIDGES	9
Classification – Importance of bridges – Investigation for bridges –Selection of bridge site components of bridges – Economical span – Traffic projection – Choice of bridge type-Specification of road bridges – Width of carriageway – Loads to be considered – Dead load –IRC Standard live load – Impact effect.		
UNIT II	**R.C. GIRDER BRIDGES**	**9**
Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.		
UNIT III	**STEEL BRIDGES**	**9**
Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.		
UNIT IV	**REINFORCED CONCRETE SLAB BRIDGES**	**9**
Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading		
UNIT V	**PRESTRESSED CONCRETE BRIDGES**	**9**
Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.		

Text Book (s)

1	Krishna Raju.N, Design of Bridges, Oxford and IBH Publishing Co., Pvt Ltd., New Delhi, 2018.
2	Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 2017

Reference (s)

1	Jagadeesh .T.R. and Jayaram.M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013.
2	Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 2008.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE022T	METRO SYSTEM AND CIVIL ENGINEERING APPLICATION	3	0	0	3

Prerequisite Course (s)

Highway and Railway Engineering

Course Objective (s): The purpose of learning this course is to:

1	Impart knowledge on metro system
2	Describe the metro construction systems
3	Outline the metro electrification systems
4	Impart knowledge on metro rolling stock
5	Learn about metro signalling system

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the necessity of metro system for urban transport
CO2	Acquire the construction of metro system
CO3	Understand metro electrification systems
CO4	Gather information on metro rolling stock
CO5	Analyse on metro signalling system

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	-	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO METRO RAIL SYSTEM	9
Overview of Metro Systems-Need for Metros-Routing studies-Basic Planning and Financials-Construction methods for Elevated and underground Stations, Viaduct spans and bridge, Underground tunnels; Depots; Commercial and Service buildings.		
UNIT II	**METRO CONSTRUCTION SYSTEM**	**9**
Initial Surveys and Investigations-Basics of Construction Planning and Management, Construction Quality and Safety Systems- Traffic integration, multimodal transfers and pedestrian facilities-Environmental and social safeguards-Track systems-permanent way.		
UNIT III	**METRO SIGNALLING AND CONTROL SYSTEM**	**9**
Signalling systems-Automatic fare collection-Operation Control Centre (OCC and BCC); SCADA and other control systems-Platform Screen Doors.		
UNIT IV	**METRO ROLLING STOCK**	**9**
Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators.		
UNIT V	**TRACTION SUBSTATIONS FOR METRO SYSTEMS**	**9**
Traction Power-Substations: TSS and ASS-Power SCADA-Standby and Backup systems Green buildings-Carbon credits and clear air mechanics.		
Text Book (s)		
1	Edwards.J.T, Civil Engineering for Underground Rail Transport, Elsevier, 2015.	
2	Marcelo Blumenfeld, A systems approach to developing a new metro for megalopolis, ICE Virtual Library.	
Reference (s)		
1	UmeshRai.B, Handbook of Research on Emerging Innovations in Rail Transportation Engineering, May, 2016	

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE023T	DISASTER MITIGATION AND MANAGEMENT	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1	Provide students an exposure to disasters, their significance and types.
2	Prepare the early plan of disaster with government officials
3	Compute the rescue plan after disaster
4	Interpret the recovery process of disaster.
5	Analyse with case studies on various disasters

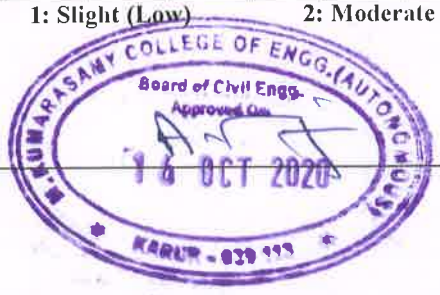
Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Explore more about disaster, vulnerability of natural hazards
CO2	Develop the disaster preparedness plan with government authorities
CO3	Identify the disaster rescue plan with recovery organisations.
CO4	Explain about rehabilitation, reconstruction and recovery measures, various roles about disaster recovery in long term
CO5	Study about disaster case studies and about space based inputs

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	2	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	2.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	INTRODUCTION TO DISASTERS	9
Concept of Disaster – Different approaches- Concept of Risk – Levels of Disasters – Disaster Phenomena and Events (Global, national and regional) Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards – Characteristics and damage potential or natural hazards; hazard assessment – Dimensions of vulnerability factors; vulnerability assessment – Vulnerability and disaster risk – Vulnerabilities to flood and earthquake hazards		
UNIT II	**DISASTER PREPAREDNESS**	**9**
Preparedness- Disaster Preparedness: Concept and Nature- Disaster Preparedness Plan- Prediction- Early Warnings and Safety Measures of Disaster. Role of Information- Education- Communication and Training- Role of Government- International and NGO Bodies- Role of IT in Disaster Preparedness- Role of Engineers on Disaster Management.		
UNIT III	**DISASTER RESPONSE**	**9**
Disaster Response: Introduction-Disaster Response Plan-Communication- Participation and Activation of Emergency Preparedness Plan- Search- Rescue- Evacuation and Logistic Management- Role of Government- International and NGO Bodies- Psychological Response and Management (Trauma, Stress, Rumor and Panic) - Relief and Recovery- Medical Health Response to Different Disasters - Organization setup NDMA		
UNIT IV	**REHABILITATION, RECONSTRUCTION AND RECOVERY**	**9**
Reconstruction and Rehabilitation as a Means of Development -Damage Assessment- Post Disaster effects and Remedial Measures- Creation of Long-term Job Opportunities and Livelihood Options- Disaster Resistant House Construction- Sanitation and Hygiene- Education and Awareness- Dealing with Victims' Psychology- Long-term Counter Disaster Planning- Role of Educational Institute.		
UNIT V	**DISASTER MANAGEMENT**	**9**
Landslide hazard zonation: Case studies- Earth quake vulnerability assessment of buildings and infrastructure: Case studies- forest fire: case studies- man-made disasters: Case studies- space based inputs for disaster mitigation and management.		

Text Book (s)	
1	Singhal J.P. "Disaster Management", Laxmi Publications, 2010.
2	Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012
Reference (s)	
1	Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
2	Government of India, National Disaster Management Policy, 2009.
3	Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme, 2012.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
PEC	18CEE024T	ENVIRONMENTAL IMPACT AND RISK ASSESSMENT	3	0	0	3

Prerequisite Course (s)

Environmental Science, Environmental Engineering I, Environmental Engineering II

Course Objective (s): The purpose of learning this course is to:

1	Study the current EIA methods, techniques and tools used
2	Make aware the Environmental impact due to various pollutants and their prevention and control Act
3	Understand about environmental management plan and its impact
4	Study the current environmental monitoring systems
5	Understand about environmental and risk assessment

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Carry out scoping and screening of developmental projects for environmental and social assessments
CO2	Prepare terms of reference for environmental impact and socio-economic impact for any development project.
CO3	Prepare the environmental management plan and its various impact mitigation
CO4	Prepare the Environment audit report development projects
CO5	Describe the legal requirements of environment risk assessment and its evaluation measures

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO2	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO4	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO5	3	2	-	-	-	1	1	-	-	-	-	1	2	1
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	2.00	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION	9
Environmental Impact Assessment (EIA)- Need for Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) - Environmental Risk Assessment (ERA) - Legal and Regulatory aspects in India - Types and limitations of EIA -Issues in EIA - Social and cultural, Impact of development projects – Sustainable development- EIA capability and limitations – Legal provisions on EIA-Stages of EIA- Types of EIA		
UNIT II	**ENVIRONMENTAL IMPACTS AND ITS ACTS**	**9**
Environmental Impacts– positive and negative environmental impact assessment– steps of doing EIA– methodology adopted –EIA procedure in India –Types of pollutants– The Environment (Protection) Act - Water (Prevention and Control of Pollution) Act , The Air (Prevention and Control of pollution) Act		
UNIT III	**ENVIRONMENTAL MANAGEMENT PLAN**	**9**
Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna–Addressing the issues related to the Project Affected People – ISO 14000		
UNIT IV	**ENVIRONMENTAL AUDIT**	**9**
Objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities - EIA 2020		
UNIT V	**RISK ASSESSMENT**	**9**
Environmental risk assessment frame work – hazard identification – dose responses evaluation – exposure assessment – exposure factors – tools – HAZOP and FEMA methods – Risk characterization – risk communication – emergency preparedness plan		

Text Book (s)

1	A K Srivastava, Environment impact Assessment, APH Publishing, 2014
2	John Glasson, Riki Theriveland S Andrew Chadwick "Introduction to EIA" University College London Press Limited, 2011
3	Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

Reference (s)

1	Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.
2	J. Petts, Handbook of Environmental Impact Assessment Vol. I and II, Blackwell Science, London, 1999.
3	John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OEC	18CEO001T	BUILDING SERVICES	3	0	0	3

Prerequisite Course (s)

Basic Electrical and Electronics Engineering

Course Objective (s): The purpose of learning this course is to:

1	Understand the equipment's used for building Services.
2	To know about the basics of electrical systems in buildings.
3	Ability to Identify the principles of illumination and design.
4	Recognize the working principle of air conditioning system for the building.
5	Identify the importance of fire detection and protection.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Examine the appropriate service equipment's required for buildings.
CO2	Recognize the lighting facilities installed during the construction of the building
CO3	Identify the principles of illumination and design.
CO4	Outline the working principle of suitable air conditioning system for the building
CO5	Analyse the characteristics of fire safety systems for various types of building

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	-	-	1	-	-	-	-	-	1	-	-
CO2	3	2	1	-	-	1	-	-	-	-	-	1	-	-
CO3	3	3	2	-	-	1	-	-	-	-	-	1	-	-
CO4	3	1	2	-	-	1	-	-	-	-	-	1	-	-
CO5	1	2	3	-	-	1	-	-	-	-	-	1	-	-
CO (Avg)	2.00	2.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	**EQUIPMENTS**	**9**
Hot Water Boilers - Lifts and Escalators - Special features required for physically handicapped and elderly - Conveyors - Vibrators - Concrete mixers - DC/AC motors - Generators - Laboratory services - Gas, water, air and electricity		
UNIT II	**ELECTRICAL SYSTEMS IN BUILDING**	**9**
Basics of electricity - Single / Three phase supply - Protective devices in electrical installations - earthing for safety - Types of earthing - ISI specifications - Types of wires, wiring systems and their choice - Planning electrical wiring for building - Main and distribution boards - Transformers and switch gears - Layout of substations- Lighting Arrester.		
UNIT III	**PRINCIPLE OF ILLUMINATION ANDDESIGN**	**9**
Design of modern lighting - Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types-Specifications of National Building Code of India.		
UNIT IV	**REFRIGERATION PRINCIPLES**	**9**
Refrigerants-Refrigerant control devices - Electric motors - Starters - Air handling units - Cooling towers - Window type and packaged air- conditioners - Chilled water plant - Fan coil systems - Water piping - Cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C. Systems		
UNIT V	**FIRE SAFETY INSTALLATION**	**9**
Causes of fire in buildings - Safety regulations - NBC - Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes - Fire Fighting pump and water storage - Dry and wet risers - Automatic sprinklers.		
Text Book (s)		
1	Hopkinson.R, GandKay.J.D, "The Lighting of buildings", Faber and Faber, London, 2000.	
2	Udayakumar.R, "A Text Book on Building Services", Eswar Press, Chennai, 2007.	
Reference (s)		
1	Arora and Bindra ,"Building Construction", Dhanpatrai and Sons,2012	
2	Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2001.	

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OEC	18CECO002T	DISASTER PREPAREDNESS, PLANNING AND MANAGEMENT	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1	Provide students an exposure to disasters, their significance and types.
2	Ensure that students begin to understand the relationship between vulnerability, disasters, disaster mitigation and risk reduction
3	Inter link the disaster and its assessment system
4	Interpret the risks caused by any disaster
5	Analyse with case studies on various disasters

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Differentiate the types of disasters, causes and their impact on environment and society
CO2	Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO3	Explain disaster damage assessment and management
CO4	Identify the disaster management techniques for Indian context
CO5	Develop the disaster management alternatives flow through case studies and team-oriented technical presentations

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	1	-	-	-	-	-	1	-	-
CO2	3	2	2	-	-	1	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	1	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	1	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	1	-	-	-	-	-	1	-	-
CO (Avg)	3.00	2.00	2.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO DISASTERS	9
Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters- earthquakes-floods drought-landside-land subsidence- cyclones-volcanoes- tsunami-avalanches-global climate extremes. Man-made disasters: Terrorism- gas and radiations leaks- toxic waste disposal- oil spills- forest fires.		
UNIT II	**STUDY OF IMPORTANT DISASTERS**	**9**
Disaster cycle - Phases, Culture of safety- prevention-mitigation and preparedness. Earthquakes and its types- magnitude and intensity- seismic zones of India- major fault systems of India plate- flood types and its management- drought types and its management- landside and its managements case studies of disasters - Social Economics and Environmental impact of disasters.		
UNIT III	**MITIGATION AND MANAGEMENT TECHNIQUES OF DISASTER**	**9**
Basic principles of disasters management- Disaster Management cycle- Disaster management policy- National and State Bodies for Disaster Management- Organization setup NDMA - Early Warming Systems- Building design and construction in highly seismic zones- retrofitting of buildings.		
UNIT IV	**COMMUNICATION AND GIS IN DISASTER MANAGEMENT**	**9**
Training and drills for disaster preparedness- Awareness generation program- Usages of GIS and Remote sensing techniques in disaster management. Role of Communication in Disasters- Types of communication in case of disasters –HAM radio- Satellite- Video Conferencing- Electronics devices.		
UNIT V	**REHABILITATION OF DISASTER**	**9**
Rehabilitation - Socio-economic Rehabilitation- Temporary Livelihood Options and Socio-Economic Rehabilitation. Education and awareness and role of Information Dissemination- Participative Rehabilitation. Role of various agencies in Recovery Work- Monitoring and Evaluation of rehabilitation work- Rehabilitation process.		

Text Book (s)	
1	Singhal J.P. "Disaster Management", Laxmi Publications, 2010.
2	Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012
Reference (s)	
1	Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
2	Government of India, National Disaster Management Policy, 2009.
3	Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme, 2012.
4	KapurAnu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

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Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OEC	18CEO003T	ENVIRONMENTAL IMPACT ASSESSMENT	3	0	0	3

Prerequisite Course (s)

Environmental Science and Engineering, Water Supply Engineering and Waste water treatment

Course Objective (s): The purpose of learning this course is to:

1	To study the current EIA methods, techniques and tools used
2	To study the current assessment methods and legislation
3	To study the current environmental monitoring systems
4	To understand the process of environmental impact modelling and prediction as a design tool
5	To make the students understand the importance of documentation and monitoring of EIA along with case studies.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Deal with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same.
CO2	Apply the knowledge acquired to the process of environmental impact modelling and prediction as design tool with application to a number of case studies
CO3	Comprehend the various impacts of development projects on environment and the mitigating measures.
CO4	Demonstrate the legal and regularity aspects of EIA in India
CO5	Evaluate the EIA practice

CO-PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO2	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO3	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO4	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO5	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION	9
Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) - Environmental Risk Assessment (ERA) - Legal and Regulatory aspects in India - Types and limitations of EIA - Issues in EIA -National - Cross sectoral - Social and cultural		
UNIT II	**METHODOLOGIES**	**9**
Measurement of environmental impact-Scope and methodologies of EIA-Screening-Scoping-Base line studies-Mitigation-Matrices-Check list.		
UNIT III	**PREDICTION AND ASSESSMENT**	**9**
Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA- Environmental Clearance		
UNIT IV	**ENVIRONMENTAL MANAGEMENT PLAN**	**9**
Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000		
UNIT V	**CASE STUDIES**	**9**
EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects –EIA 2020		

Text Book (s)	
1	Canter.L.W, Environmental Impact Assessment, McGraw Hill, New York, 1996.
2	Anjaneyulu Y., "Environmental impact assessment methodologies" BS Publications/BSP Books, 2010.
3	Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.
Reference (s)	
1	Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.
2	Petts J, Handbook of Environmental Impact Assessment Vol. I and II, Blackwell Science, London,1999.
3	John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OEC	18CEO004T	REMOTE SENSING AND GIS	3	0	0	3

Prerequisite Course (s)

Surveying

Course Objective (s): The purpose of learning this course is to:

1	To impart fundamental knowledge on concepts of Remote sensing
2	To impart knowledge applications leading to modelling of earth resources management using remote sensing
3	To impart knowledge on the planning and development skills in advance techniques for mapping, modelling and monitoring
4	To impart knowledge geographic information system in data processing
5	To impart knowledge data analysis and application of GIS

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Analyse the principles and components of photogrammetric and remote sensing
CO2	Process of data acquisition of satellite images and their characteristics
CO3	Analyse an image visually and digitally with digital image processing techniques
CO4	Elucidate the concepts and fundamentals of GIS
CO5	Apply the knowledge of remote sensing and GIS in different civil engineering filed

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	1	-	-	-	-	-	1	-	-
CO2	2	1	-	-	-	1	-	-	-	-	-	1	-	-
CO3	2	1	-	-	-	1	-	-	-	-	-	1	-	-
CO4	2	1	-	-	-	1	-	-	-	-	-	1	-	-
CO5	2	1	-	-	-	1	-	-	-	-	-	1	-	-
CO (Avg)	2.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO REMOTE SENSING	9
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan- Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts –typical spectral reflective characteristics of water, vegetation and soil.		
UNIT II	**PLATFORMS AND SENSORS**	**9**
Types of platforms – orbit types, Sun- synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors		
UNIT III	**IMAGE INTERPRETATION AND ANALYSIS**	**9**
Types of Data Products – types of image interpretation- basic elements of image interpretation- visual interpretation keys – Digital image processing – Pre-processing – image enhancement techniques – multispectral image classification – supervised and unsupervised.		
UNIT IV	**GEOGRAPHIC INFORMATION SYSTEM**	**9**
Introduction – Maps- Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software – data type – Spatial and non-spatial (attribute) data – measurement scales- Data base Management Systems (DBMS).		
UNIT V	**DATA ANALYSIS**	**9**
Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Application of GIS in highway- alignment studies, Environmental and water resources – land Information system.		

Text Book (s)

1	Ian Heywood "An Introduction to GIS", Pearson Education, Asia, 4th Edition 2012.
2	Lo.C.P and A.K.W.Yeung, "Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition 2010

Reference (s)

1	Burrough P.A. and Rachel A. McDonell, "Principles of Geographical Information Systems", Oxford Publication, 3rd Edition 2016.
2	Thomas. M.Lillesand and Ralph. W. Kiefer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 7th Edition 2015.
3	Basudeb Bhatta "Remote sensing and GIS" Oxford Publication, 2nd Edition 2011.

Regulation 2018		Semester __	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OEC	18CEO005T	METRO SYSTEM AND ENGINEERING	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1	Understand about introduction and Overview of metro rail system
2	Know about planning and construction of metro system
3	Outline the metro operations and electrification system
4	Summary about technical structures and standards of metro railways
5	Understand the concept of metro signaling

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Summarize regarding metro rail system
CO2	Infer about detailed planning and construction activities of metro rail system
CO3	Outline the electrification control and operation systems
CO4	Generalize about metro rolling stock
CO5	Identify the signalling process in metro rail system

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO2	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO3	3	2	-	-	-	1	1	-	-	-	-	1	-	-
CO4	3	2	-	-	-	1	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	1	-	-	-	-	-	1	-	-
CO (Avg)	3.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	METRO RAIL SYSTEM	9
Introduction to Metro Rail System-Origin of Metro Rail System-Overview of World Metro Systems.		
UNIT II	METRO CONSTRUCTION	9
Planning of Metro system-Selection of Metro system-Construction of Metro system-Metro Track.		
UNIT III	METRO ELECTRIFICATION SYSTEMS	9
Salient features of Power Supply-Salient features of Traction-Benefits of Supervisory Control and Data Acquisition system- Metro Operations		
UNIT IV	METRO ROLLING STOCK	9
Rolling Stock-Technical Details of Metro Rolling Stock- Technical Standards of Track Structure for Metro Railways.		
UNIT V	METRO SIGNALING	9
Signaling in Metro system-Introduction of metro act-Report of Ministry of Urban Development on standardization of metro system.		

Text Book (s)	
1	EdwardsJ. T, Civil Engineering for Underground Rail Transport, Elsevier, 2015.
2	Marcelo Blumenfeld, A systems approach to developing a new metro for megalopolis, ICE Virtual Library.
Reference (s)	
1	UmeshRai B, Handbook of Research on Emerging Innovations in Rail Transportation Engineering, May, 2016

Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX001J	BUILDING PLANNING AND VAASTHU	0	1	1	1

Prerequisite Course (s)

Basic Civil and Mechanical Engineering, Engineering Graphics, Computer Aided Civil Engineering Drawing

Course Objective (s): The purpose of learning this course is to:

1	To gain knowledge about building regulations and basic aspects of planning
2	To understand the concept of vaasthu

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Students can be able to implement the principles of vaasthu in real time
CO2	Students can draw the building approval plan for residential buildings

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	1	-	1	1	1	-	1	3	3
CO2	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO (Avg)	2.50	1.50	1.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content	15

Theory Session

Vaasthu introduction, directions, location of rooms, building bye laws,community open spaces and amenities, distance from electric lines, sanitary arrangements and requirements for different types of building, occupancy classification, front rear space, staircase, parking regulations, floor area ratio, types of building, occupancy load, lifts, facility for differently-abled people, building plan approval, rules and regulation.

Laboratory Session

Preparation of Building approval plan as per bye laws

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Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX002L	TEKLA STRUCTURES	0	0	2	1

Prerequisite Course (s)

Design of Steel Structures, Design of Reinforced Concrete Structures, Computer Aided Civil Engineering Drawing

Course Objective (s): The purpose of learning this course is to:

1	This course covers the concise knowledge of creating a model of structure, analysis and design

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Use TEKLA for analyse, design of concrete and steel structure
CO2	Development and implement of software program for concrete elements and detailing of structures

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO2	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO (Avg)	3.00	2.00	1.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content	15

List of Topics to be covered:

1. Introduction, basic modelling tools and comments
2. Create basic frame model and modification tools
3. Components
4. Numbering and reports
5. Basic drawing tools

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Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX003L	ADVANCED SURVEYING USING TOTAL STATION	0	0	2	1

Prerequisite Course (s)

Surveying, Computer Aided Civil Engineering Drawing

Course Objective (s): The purpose of learning this course is to:

1	At the end of this course, the student will have the knowledge about the working of Total Station equipment and solve the surveying problems

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the basic principles, operation of total station, ability to take measurements and make a construction layout
CO2	Use techniques, skills necessary for surveying by using total station and preparing the drawings

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	3	1	-	1	1	1	-	1	3	3
CO2	3	2	2	1	3	1	-	1	1	1	-	1	3	3
CO (Avg)	2.50	1.50	2.00	1.00	3.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content — 15

1. Introduction - surveying principle and methods - various opportunities for survey specialization
2. Introduction about station + B.S. -resection - EDM concepts
3. missing line measurement concepts - line stakeout concepts
4. Topography and contour - traversing survey - area calculation - arc stakeout
5. Construction Marking: Earthwork marking, footing marking, column marking, plinth beam marking, roof beam marking, slab marking, road marking, drainage marking, compound marking.
6. Drawings: Topo drawing, contour drawing, road drawing, as build drawing, construction coordinates drawing

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7. Residential, commercial, industrial and infrastructure sector, project survey work, drawing preparation for all the sectors
8. Upload / Download and drawing, map creation
9. GPS concepts

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Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX004L	STRUCTURAL ANALYSIS AND DESIGN USING STAAD PRO	0	0	2	1

Prerequisite Course (s)

Analysis of Structures, Design of Steel Structures, Design of Reinforced Concrete Structures, Computer Aided Civil Engineering Drawing

Course Objective (s): The purpose of learning this course is to:

1	Improve the programming skills for analysis and design of structures
2	Use the modern computing tools to formulate analyze and design of various concrete and steel structures

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Use STAAD PRO for analyse, design of concrete and steel structure
CO2	Development and implement of software program for concrete elements and detailing of structures

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO2	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO (Avg)	3.00	2.00	1.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content 15

DEVELOPMENT AND IMPLEMENTATION OF PROGRAM USING STAAD PRO

1. Analysis & Design of 2D & 3D Truss
2. Analysis & Design of 2D & 3D Frames
3. Analysis and design of simple two storey buildings
4. Design and detailing of concrete structural elements
5. Structural design of steel gable frames

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DEVELOPMENT AND IMPLEMENTATION OF PROGRAM USING SOFTWARE TOOLS

1. Design of one way slab and two way slab
2. Design of singly and doubly reinforced beams (Design and check for shear & deflection)
3. Design of columns
4. Design of isolated footing

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Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX005L	BUILDING ANALYSIS AND DESIGN USING ETABS	0	0	2	1

Prerequisite Course (s)

Analysis of Structures, Design of Steel Structures, Design of Reinforced Concrete Structures, Computer Aided Civil Engineering Drawing

Course Objective (s): The purpose of learning this course is to:

1	Improve the programming skills for analysis and design of structures
2	Use the modern computing tools to formulate analyze and design of various concrete and steel structures

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Use ETABS for analyse, design of concrete and steel structure
CO2	Development and implement of software program for concrete elements and detailing of structures

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO2	3	2	1	-	3	1	-	1	1	1	-	1	3	3
CO (Avg)	3.00	2.00	1.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content	15

DEVELOPMENT AND IMPLEMENTATION OF PROGRAM USING STAAD PRO

1. Analysis & Design of 2D & 3D Truss
2. Analysis & Design of 2D & 3D Frames
3. Analysis and design of simple two storey buildings
4. Design and detailing of concrete structural elements
5. Structural design of steel gable frames

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DEVELOPMENT AND IMPLEMENTATION OF PROGRAM USING SOFTWARE TOOLS

1. Design of one way slab and two way slab
2. Design of singly and doubly reinforced beams (Design and check for shear & deflection)
3. Design of columns
4. Design of isolated footing

Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX006L	BUILDING INFORMATION MODELLING USING REVIT ARCHITECTURE	0	0	2	1

Prerequisite Course (s)

Computer Aided Civil Engineering Drawing, Building Planning and Vaasthu

Course Objective (s): The purpose of learning this course is to:

1	Describe building information modelling, and parametric relationships in Revit
2	Create a basic floor plan, add and modify walls and compound walls, use editing tools, and work with doors and windows

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Use basic Revit commands and features to create parametric models and produce architectural drawings
CO2	Display basic Revit skills needed for an intermediate level course

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	1	-	1	1	1	-	1	3	3
CO2	2	-	-	-	3	1	-	1	1	1	-	1	3	3
CO (Avg)	2.00	0.00	0.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content 15

USER INTERFACE: Change the View Scale - Identify File Types - Identify primary parts of User interface - Use the project Browser. **DOCUMENTATION:** Create the Title sheet. **ELEMENTS:** Create and Modify walls - Edit doors - Edit Windows - Tag elements (doors, windows, etc) by category - Trim Objects. **FAMILIES:** Work with families. **MODELING:** Add Dimensions - Add model text to plan - Create a roof and modify roof properties - Create a stair with landing - Define Floor for mass - Model railings - Use grids. **VIEWS:** Create a schedule and add schedule tags - Create section views - Use levels - Render.

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Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX007L	PROJECT MANAGEMENT USING MS PROJECT	0	0	2	1

Prerequisite Course (s)

Construction Engineering and Management

Course Objective (s): The purpose of learning this course is to:

1	Introduce project management skills using MS Project
2	Assist project manager in scheduling, resource allocation and tracking the progress

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Create a new plan and milestones, allocate resources and levelling of resources
CO2	Prepare schedule and track the progress, analyse the costs involved and manage the budget

CO-PO Mapping

Cos	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	3	1	-	-	1	1	1	1	3	3
CO2	3	2	1	-	3	1	-	1	1	1	1	1	3	3
CO (Avg)	2.50	1.50	1.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content	15

Introduction, project management, creating a new plan, creating milestones, WBS, duration, critical path, setting up resources, task management,resource allocation, resource leveling,resource smoothing, scheduling, bar chart, track progress, task costs, resource costs, budget management, workload analysis, report generation.

Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX008L	PROJECT MANAGEMENT USING PRIMAVERA	0	0	2	1

Prerequisite Course (s)

Construction Engineering and Management

Course Objective (s): The purpose of learning this course is to:

1	Improve the project management skills through primavera software
2	Use the effective methods and quantitative tools to plan, organize, and control construction projects

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Plan and manage your project activities effectively through tracking ofbudget and other project expenses
CO2	Optimize the various resources involved in the project, reduce the risk of schedule and cost overrun

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	3	1	-	-	1	1	1	1	3	3
CO2	3	2	1	-	3	1	-	1	1	1	1	1	3	3
CO (Avg)	2.50	1.50	1.00	0.00	3.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content	15

Introduction, PMDB, MMDB,EPS, OBS, structuring the project, work breakdown structure, codes, notebooks, calendars, creating relationships, critical path method, assigning constraints, understanding and assigning of roles and responsibilities, resource allocation, resource leveling, resource smoothing, management of time, optimizing the project plan, executing the project plan, optimizing the resource and cost, risk assessment and control, analyzing the updated project, project monitoring and control, reporting system and project portfolio management.

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Regulation 2018		Semester	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OCC	18CEX009L	SKETCHUP	0	0	2	1

Prerequisite Course (s)

Computer Aided Civil Engineering Drawing

Course Objective (s): The purpose of learning this course is to:

1	Learn the strategies and skills for 3D modeling with SketchUp, managing complex architectural models, as well as to create appealing presentation
2	Select the suitable tools to make real-time 3D models with help of modification tools

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Prepare accurate, organized, efficiently constructed three-dimensional models of objects, architectural forms, interior spaces and importing measured drawings and other objects into SketchUp
CO2	Use SketchUp, Photoshop and rendering plugins, combined with traditional drawing methods, to enhance visual communication throughout the process

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	2	1	-	-	1	-	-	1	3	2
CO2	2	1	-	-	2	1	-	-	1	-	-	1	3	2
CO (Avg)	2.00	1.00	0.00	0.00	2.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	3.00	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Content	15

The Basics: Opening SketchUp - SketchUp Screen – Toolbars-Viewing Tools - Shortcut Keys - Drawing Tools (Line, Rectangle, Square, Push/Pull, Circle, Polygon, Arc).

Manipulation Tools: Select – Eraser - Tape Measure – Protractor - Move and Copy - Rotate and Copy – Scale – Offset – Axes - Displaying and Smoothing Edges - Intersect Faces and Follow Me - Intersect Faces - Combining Follow Me and Intersect Faces - Making Multiple Copies - Basic Move and Copy - Internal Arrays - Non-Orthogonal Copies -Multiple Rotated Copies.

Working With Roofs, Groups and Components: Simple Roofs and Dormers Components Versus

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Groups - Groups (Sticking, Edge Breaks, Nested, Solids) - Components (3D Warehouse, Inserting, Scaling, Aligning).

Painting, Materials, Textures, Adding Text, and Dimensions: Applying Materials. - Editing Materials - Using Images as Textures - Material Collections - Material Translucency - Materials of Groups and Components -Text – Dimensions - 3D Text.

Creating a Model and Extensions Overview: Mirroring a model - Creating an array - Applying materials - Creating Exact Geometry - Entity Info - Exact Moving and Copying - Exact Rotated Copies – Symmetry - Measuring Length and Area - Scaling in 3D – Render - Extension Warehouse - Installing Other Extensions - Managing Extensions. - Other Popular Extensions.