K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF CIVIL ENIGNEERING

(REGULATIONS 2020)

Vision of the Institution

IV	We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

IM 1	To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.
IM 2	To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department / Programme: (Civil Engineering)

DV	To impart knowledge and excellence in Civil Engineering and Technology with global perspectives to our students and to make them ethically strong engineers to create conducive environment.

Mission of the Department / Programme: (Civil Engineering)

DM 1	To promote innovative thinking in the minds of budding engineers and to make the department a centre of excellence in the field of Engineering.
DM 2	To provide knowledge base and moral autonomy to address regional, national and international needs in Civil Engineering.

Programme Educational Objectives (PEOs): (Civil Engineering)

The graduates of the programme will be able to	
PEO 1	**Successful Career:** Design and contribute to the infrastructure development project being undertaken by various sectors and evolves as a successful engineer.
PEO 2	**Lifelong Learning:** Pursue higher studies so that they can contribute to the society in terms of academic, research, sustainable development and other allied fields.
PEO 3	**Service to Society:** Work effectively and ethically in multicultural and multidisciplinary groups in accordance with technological change for the growth of Civil Engineering projects.

Programme Outcomes (POs) of B.E. –Civil Engineering

Program Outcomes (POs)	
PO1	**Engineering Graduates will be able to:** **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 modelling 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	**Environmental 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.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
Program Specific Outcomes (PSOs)	
PSO1	**Research Culture:** Update research knowledge in Civil Engineering to solve the unknown issues that they have not encountered before.
PSO2	**Core Values:** Contribute core Universal values and social good in the community by Civil Engineering Profession.

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Department	Civil Engineering
Programme	B.E. – Civil Engineering

SEMESTER - I

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20EN151	Technical English – I (Common to all Branches)	HSC	2	0	1	3	30	70	100
2.	20MA151	Engineering Mathematics – I (Common to all Branches)	BSC	3	1	0	4	30	70	100
3.	20CH051	Engineering Chemistry (Common to all Branches)	BSC	3	0	0	3	30	70	100
4.	20EE041	Basics of Electrical and Electronics Engineering (Common to AU,CE,CS,IT,ME & SF)	ESC	3	0	0	3	30	70	100
PRACTICAL										
5.	20CH028	Chemistry Laboratory (Common to all Branches)	BSC	0	0	3	1	50	50	100
6.	20AU127	Engineering Graphics Laboratory (Common to CE,CS,EC, EE & IT)	ESC	0	0	3	1	50	50	100
7.	20GE028	Manufacturing Practices Laboratory (Common to all Branches)	ESC	0	0	3	1	50	50	100
MANDATORY COURSE										
8.	20MC151	Induction Programme* (Common to all Branches)	MC	-	-	-	-	50	50	100
Total				11	1	10	16	800		

*Induction program will be conducted for three weeks as per AICTE guidelines

SEMESTER - II

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20EN251	Technical English – II (Common to all Branches)	HSC	2	0	1	3	30	70	100
2.	20MA241	Engineering Mathematics – II (Common to AU,CE, ME, & SF)	BSC	3	1	0	4	30	70	100
3.	20PH051	Engineering physics (Common to all branches)	BSC	3	0	0	3	30	70	100
4.	20CS241	Python Programming (Common to AU,CE,EC,EE,ME & SF)	ESC	3	0	0	3	30	70	100
5.	20CE231	Engineering Mechanics	ESC	3	0	0	3	30	70	100
PRACTICAL										
6.	20PH028	Physics Laboratory (Common to all Branches)	BSC	0	0	3	1	50	50	100
7.	20CS227	Python Programming Laboratory (Common to AU,CE,EE,EC,ME & SF)	ESC	0	0	3	1	50	50	100
MANDATORY COURSE										
8.	20MC052	Environmental Science and Engineering	MC	3	0	0	0	50	50	100
Total				17	1	7	18	800		

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Department	Civil Engineering
Programme	B.E. – Civil Engineering

SEMESTER - III

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20MA331	Engineering Mathematics -III	BSC	3	1	0	4	30	70	100
2.	20CE312	Engineering Geology	ESC	3	0	0	3	30	70	100
3.	20CE313	Fluid Mechanics	PCC	3	0	0	3	30	70	100
4.	20CE314	Mechanics of Solids	ESC	3	0	0	3	30	70	100
5.	20CE315	Surveying	PCC	3	0	0	3	30	70	100
6.	20CE316	Construction Materials	ESC	2	0	0	2	30	70	100
PRACTICAL										
7.	20CE321	Computer aided Building Drawing	ESC	0	0	3	1	50	50	100
8.	20CE322	Survey Practical	PCC	0	0	3	1	50	50	100
9.	20CE323	Strength of Materials Laboratory	PCC	0	0	3	1	50	50	100
10.	20HR351	Career Development Skills- I (Common to all Branches)	EEC	0	2	0	0	100	00	100
TOTAL				17	3	9	21	1000		

SEMESTER - IV

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20MA432	Numerical Methods	BSC	3	1	0	4	30	70	100
2.	20CE412	Soil Mechanics	PCC	3	0	0	3	30	70	100
3.	20CE413	Strength of Materials	PCC	3	1	0	4	30	70	100
4.	20CE414	Applied Hydraulic and Hydraulic Machinery	PCC	3	0	0	3	30	70	100
5.	20CE415	Construction Techniques and Practices	PCC	3	0	0	3	30	70	100
6.	20CE416	Highway Engineering	PCC	3	0	0	3	30	70	100
PRACTICAL										
7.	20CE421	Fluid Mechanics and Machinery Laboratory	PCC	0	0	3	1	50	50	100
8.	20CE422	Soil Mechanics Laboratory	PCC	0	0	3	1	50	50	100
9.	20CE423	Highway Engineering Laboratory	PCC	0	0	3	1	50	50	100
10.	20HR422	Career Development Skills- II	EEC	0	2	0	0	50	50	100
Total				18	4	9	23	1000		

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Programme	B.E. – Civil Engineering

SEMESTER V

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20HS051	Universal Human Values and Understanding Harmony	HSC	3	0	0	3	30	70	100
2.	20CE511	Railways, Airport and Harbour Engineering	PCC	3	0	0	3	30	70	100
3.	20CE512	Foundation Engineering	PCC	3	0	0	3	30	70	100
4.	20CE513	Concrete Technology	PCC	3	0	0	3	30	70	100
5.	20CE514	Structural Analysis - I	PCC	3	0	0	3	30	70	100
6.	20CE515	Design of Reinforced concrete	PCC	3	0	0	3	30	70	100
7.	20CE516	Water supply Engineering	PCC	3	0	0	3	30	70	100
PRACTICAL										
8.	20CE521	Environmental Engineering Laboratory	PCC	0	0	3	1	50	50	100
9.	20CE522	Concrete Laboratory	PCC	0	0	3	1	50	50	100
10.	20HR523	Career Development Skills- III	EEC	0	2	0	0	50	50	100
TOTAL				18	3	6	23	1000		

SEMESTER –VI

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20CE611	Irrigation Engineering	PCC	3	0	0	3	30	70	100
2.	20CE612	Structural Analysis - II	PCC	3	0	0	3	30	70	100
3.	20CE613	Design of Steel Structures	PCC	3	0	0	3	30	70	100
4.	20CE614	Sewage Water Engineering	PCC	3	0	0	3	30	70	100
5.		Professional Elective – I	PEC	3	0	0	3	30	70	100
6.		Open Elective – I	OEC	3	0	0	3	30	70	100
7.		Open Elective – II	OEC	3	0	0	3	30	70	100
PRACTICAL										
8.	20CE621	Irrigation and Environmental Engineering Drawing	ESC	0	0	3	1	50	50	100
9.	20CE622	Survey Camp (2 weeks during V Sem vacation)	EEC	0	0	3	1	50	50	100
10.	20HR624	Career Development Skills- IV	EEC	0	2	0	0	50	50	100
Total				18	2	6	23	1000		

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SEMESTER VII

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20CE712	Quantity Surveying and Estimation	PCC	3	0	0	3	30	70	100
2.		Professional Elective – II	PEC	3	0	0	3	30	70	100
3.		Professional Elective –III	PEC	3	0	0	3	30	70	100
4.		Open Elective – III	OEC	3	0	0	3	30	70	100
5.		Open Elective – IV	OEC	3	0	0	3	30	70	100
PRACTICAL										
6.	20CE721	Structural Design and Drawing Laboratory	ESC	0	0	3	1	50	50	100
7.	20CE722	Design Project	EEC	0	0	6	3	50	50	100
8.	20CE723	Industrial Training (4 weeks during VI Sem vacation)	EEC	0	0	0	2	50	50	100
MANDATORY COURSE										
9.	20MC053	Essence of Indian Traditional Knowledge (Common to all Branches)	MC	3	0	0	0	50	50	100
TOTAL				18	0	9	21	900		

SEMESTER –VIII

Sl. No.	Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20CE811	Construction Management	PCC	3	0	0	3	30	70	100
2.		Professional Elective – IV	PEC	3	0	0	3	30	70	100
3.		Professional Elective – V	PEC	3	0	0	3	30	70	100
PRACTICAL										
4.	20CE821	Project Work	EEC	0	0	12	6	50	50	100
Total				9	0	12	15	400		

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List of Electives

PROFESSIONAL ELECTIVE – I (SEMESTER – VI)

Sl. No.	Course Code	Course Name	Specialization	Category	Hours / Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	20CE661	Prefabricated Structures	S1	PEC	3	0	0	3	30	70	100
2.	20CE662	Maintenance and Rehabilitation of Structures	S2	PEC	3	0	0	3	30	70	100
3.	20CE663	Hydrology	S4	PEC	3	0	0	3	30	70	100
4.	20CE664	Remote Sensing and GIS	S5	PEC	3	0	0	3	30	70	100
5.	20CE665	Traffic Engineering and Management	S6	PEC	3	0	0	3	30	70	100
6.	20CE666	Ground Improvement Techniques	S7	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – II (SEMESTER – VII)

Sl. No.	Course Code	Course Name	Specialization	Category	Hours / Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	20CE761	Pre-stressed Concrete	S1	PEC	3	0	0	3	30	70	100
2.	20CE762	Bridge Engineering	S1	PEC	3	0	0	3	30	70	100
3.	20CE763	Construction Safety Practices	S2	PEC	3	0	0	3	30	70	100
4.	20CE764	Air Pollution Management	S3	PEC	3	0	0	3	30	70	100
5.	20CE765	Geographical Information System	S5	PEC	3	0	0	3	30	70	100
6.	20CE766	Urban Planning and Development	S6	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – III (SEMESTER – VII)

Sl. No.	Course Code	Course Name	Specialization	Category	Hours / Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	20CE767	Industrial Structures	S1	PEC	3	0	0	3	30	70	100
2.	20CE768	Basics of Dynamics and Aseismic design	S1	PEC	3	0	0	3	30	70	100
3.	20CE769	Introduction to smart cities	S2	PEC	3	0	0	3	30	70	100
4.	20CE771	Environmental Impact Assessment	S3	PEC	3	0	0	3	30	70	100
5.	20CE772	Industrial Waste Management	S3	PEC	3	0	0	3	30	70	100
6.	20CE773	Geographical Informatics Application for Civil Engineering	S5	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – IV (SEMESTER – VIII)											
Sl. No.	**Course Code**	**Course Name**	**Specialization**	**Category**	**Hours / Week**			**Credit**	**Maximum Marks**		
					L	**T**	**P**	**C**	**CA**	**ES**	**Total**
1.	20CE861	Disaster Resisting Structures	S1	PEC	3	0	0	3	30	70	100
2.	20CE862	Smart Materials and Smart Structures	S1	PEC	3	0	0	3	30	70	100
3.	20CE863	Housing, Planning and Management	S2	PEC	3	0	0	3	30	70	100
4.	20CE864	Municipal Waste and Management	S3	PEC	3	0	0	3	30	70	100
5.	20CE865	Pavement Engineering	S6	PEC	3	0	0	3	30	70	100
6.	20CE866	Site Investigation and Soil Exploration	S7	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – V (SEMESTER – VII)											
Sl. No.	**Course Code**	**Course Name**	**Specialization**	**Category**	**Hours / Week**			**Credit**	**Maximum Marks**		
					L	**T**	**P**	**C**	**CA**	**ES**	**Total**
1.	20CE867	Earthquake Engineering	S1	PEC	3	0	0	3	30	70	100
2.	20CE868	Finite Element Method	S1	PEC	3	0	0	3	30	70	100
3.	20CE869	Architectural Planning Aspects	S2	PEC	3	0	0	3	30	70	100
4.	20CE871	Green Building	S2	PEC	3	0	0	3	30	70	100
5.	20CE872	Environmental Laws and Policies	S3	PEC	3	0	0	3	30	70	100
6.	20CE873	Soil Dynamics and Machine Foundations	S7	PEC	3	0	0	3	30	70	100

S1 -Structural Engineering

S2 - Construction Engineering

S3 - Environmental Engineering

S4 - Hydrology & Water Resources

S5 - Geo informatics & Survey Engineering

S6 - Transport Engineering

S7 - Soil & Foundation Engineering

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Programme	B.E. – Civil Engineering	
List of Open Elective courses offered by other branches (SEMESTER VI to VII)		

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
Automobile Engineering											
1.	20AU901	Basics of Automobile Engineering	AE	OEC	3	0	0	3	30	70	100
2.	20AU902	Automotive Engine Technology	AE	OEC	3	0	0	3	30	70	100
3.	20AU903	Automotive Vehicle Technology	AE	OEC	3	0	0	3	30	70	100
4.	20AU904	Automotive Safety	AE	OEC	3	0	0	3	30	70	100
5.	20AU905	Hybrid Vehicles	AE	OEC	3	0	0	3	30	70	100
6.	20AU906	Off Highway Vehicles	AE	OEC	3	0	0	3	30	70	100
7.	20AU907	Modern and Intelligent Vehicle System	AE	OEC	3	0	0	3	30	70	100
8.	20AU908	Vehicle Maintenance	AE	OEC	3	0	0	3	30	70	100
Computer Science and Engineering											
9.	20CS901	Programming in Java	CSE	OEC	3	0	0	3	30	70	100
10.	20CS902	Basic concepts of Data Structure	CSE	OEC	3	0	0	3	30	70	100
11.	20CS903	Fundamentals of Database Concepts	CSE	OEC	3	0	0	3	30	70	100
12.	20CS904	Internet Programming	CSE	OEC	3	0	0	3	30	70	100
13.	20CS905	Fundamentals of Mobile Applicatio Development	CSE	OEC	3	0	0	3	30	70	100
14.	20CS906	Principles of Ethical Hacking	CSE	OEC	3	0	0	3	30	70	100
15.	20CS907	Green Technology	CSE	OEC	3	0	0	3	30	70	100
16.	20CS908	Artificial Intelligence and Robotics	CSE	OEC	3	0	0	3	30	70	100
17.	20CS909	Big Data and Analytics	CSE	OEC	3	0	0	0	30	70	100
18.	20CS910	Hardware and Trouble Shooting	CSE	OEC	3	0	0	3	30	70	100
Electronics and Communication Engineering											
19.	20EC901	Basics of Medical Electronics	EC	OEC	3	0	0	3	30	70	100
20.	20EC902	NANO Technology	EC	OEC	3	0	0	3	30	70	100
21.	20EC903	Electronics and Microprocessor	EC	OEC	3	0	0	3	30	70	100
22.	20EC904	Analog and Digital Communication	EC	OEC	3	0	0	3	30	70	100
23.	20EC905	Principles of Communication	EC	OEC	3	0	0	3	30	70	100
24.	20EC906	Fundamentals of Robotics	EC	OEC	3	0	0	3	30	70	100
25.	20EC907	Internet of Things Sensing and Actuator Devices	EC	OEC	3	0	0	3	30	70	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
26.	20EC908	Consumer Electronics	EC	OEC	3	0	0	3	30	70	100
Electrical and Electronics Engineering											
27.	20EE901	Electrical Drives and Control	EE	OEC	3	0	0	3	30	70	100
28.	20EE902	Power Semiconductor Devices	EE	OEC	3	0	0	3	30	70	100
29.	20EE903	Electrical Power Generation Systems	EE	OEC	3	0	0	3	30	70	100
30.	20EE904	Control Engineering	EE	OEC	3	0	0	3	30	70	100
31.	20EE905	Industrial Automation	EE	OEC	3	0	0	3	30	70	100
32.	20EE906	Electrical Instruments and Measurements	EE	OEC	3	0	0	3	30	70	100
33.	20EE907	Energy Conservation and Management	EE	OEC	3	0	0	3	30	70	100
34.	20EE908	Electrical Wiring, Estimation and Costing	EE	OEC	3	0	0	3	30	70	100
35.	20EE909	Fundamentals of Electrical Machinery	EE	OEC	3	0	0	3	30	70	100
36.	20EE910	Principles of Soft Computing Techniques	EE	OEC	3	0	0	3	30	70	100
37.	20EE911	Embedded System Technology	EE	OEC	3	0	0	3	30	70	100
Information Technology											
38.	20IT901	Data Science using R	IT	OEC	3	0	0	3	30	70	100
39.	20IT902	Principles of Cyber Security	IT	OEC	3	0	0	3	30	70	100
40.	20IT903	Fundamentals of Business Intelligence	IT	OEC	3	0	0	3	30	70	100
41.	20IT904	Blockchain Technologies	IT	OEC	3	0	0	3	30	70	100
42.	20IT905	Internet of Things and Applications	IT	OEC	3	0	0	3	30	70	100
43.	20IT906	Principles of Software Testing	IT	OEC	3	0	0	3	30	70	100
44.	20IT907	Foundation Skills in Logic Building	IT	OEC	3	0	0	3	30	70	100
45.	20IT908	Principles of Cloud Computing	IT	OEC	3	0	0	3	30	70	100
46.	20IT909	Open Source Technologies	IT	OEC	3	0	0	3	30	70	100
47.	20IT910	Principles of Software Engineering	IT	OEC	3	0	0	3	30	70	100
Mechanical Engineering											
48.	20ME901	Basic Mechanical Engineering	ME	OEC	3	0	0	3	30	70	100
49.	20ME902	Solar Energy Utilization	ME	OEC	3	0	0	3	30	70	100
50.	20ME903	Production Technology of Agricultural Machinery	ME	OEC	3	0	0	3	30	70	100
51.	20ME904	Selection of Materials	ME	OEC	3	0	0	3	30	70	100
52.	20ME905	Marine Vehicles	ME	OEC	3	0	0	3	30	70	100
53.	20ME906	Sensors and Transducers	ME	OEC	3	0	0	3	30	70	100
54.	20ME907	Energy Auditing	ME	OEC	3	0	0	3	30	70	100
55.	20ME908	Fiber Reinforced Plastics	ME	OEC	3	0	0	3	30	70	100
56.	20ME909	Lean Manufacturing	ME	OEC	3	0	0	3	30	70	100
57.	20ME910	Surface Engineering	ME	OEC	3	0	0	3	30	70	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
Safety and Fire Engineering											
58.	20SF901	Occupational Health and Hygiene	SF	OEC	3	0	0	3	30	70	100
59.	20SF902	Construction Safety	SF	OEC	3	0	0	3	30	70	100
60.	20SF903	Building Fire Safety	SF	OEC	3	0	0	3	30	70	100
61.	20SF904	Safety in Electrical Engineering	SF	OEC	3	0	0	3	30	70	100
62.	20SF905	Legal Aspects of Safety	SF	OEC	3	0	0	3	30	70	100
63.	20SF906	Safety in Industries	SF	OEC	3	0	0	3	30	70	100
64.	20SF907	Food Safety	SF	OEC	3	0	0	3	30	70	100
65.	20SF908	Safety Management and its Principles	SF	OEC	3	0	0	3	30	70	100
66.	20SF909	Safety in Automobile Engineering	SF	OEC	3	0	0	3	30	70	100
67.	20SF910	Safety in Transportation	SF	OEC	3	0	0	3	30	70	100
Science and Humanities											
68.	20SH901	Applications of Statistics	FYA	OEC	3	0	0	3	30	70	100
69.	20SH902	Combinatorics and Graph Theory	FYA	OEC	3	0	0	3	30	70	100
70.	20SH903	Optimization Techniques	FYA	OEC	3	0	0	3	30	70	100
71.	20SH904	Basic Military Education and Training	FYA	OEC	3	0	0	3	30	70	100
72.	20SH905	Professional Communication	FYA	OEC	3	0	0	3	30	70	100
73.	20SH906	Fundamentals of Nanoscience and Technology	FYA	OEC	3	0	0	3	30	70	100

	K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE, New Delhi & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode – 637 215	CURRICULUM UG R - 2020
Department	Civil Engineering	
Programme	B.E. – Civil Engineering	

Open Elective courses offered by Civil Engineering to other branches

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	20CE901	Architectural Heritage of India	CE	OEC	3	0	0	3	30	70	100
2.	20CE902	Building Planning and Construction	CE	OEC	3	0	0	3	30	70	100
3.	20CE903	Elementary Civil Engineering	CE	OEC	3	0	0	3	30	70	100
4.	20CE904	Energy and Environment	CE	OEC	3	0	0	3	30	70	100
5.	20CE905	Environmental Laws and Policies	CE	OEC	3	0	0	3	30	70	100
6.	20CE906	Global Warming and Climate Change	CE	OEC	3	0	0	3	30	70	100
7.	20CE907	Introduction to Disaster Management and Mitigation	CE	OEC	3	0	0	3	30	70	100
8.	20CE908	Introduction to Earthquake Engineering	CE	OEC	3	0	0	3	30	70	100
9.	20CE909	Solid Waste Management	CE	OEC	3	0	0	3	30	70	100
10.	20CE910	Water and Air Pollution Management	CE	OEC	3	0	0	3	30	70	100

LIST OF VALUE ADDED COURSES

Sl. No.	Course Name	Numbers of Hours	Offered by Internal / External
1.	Contract and Tender Procedures	15	Internal/External
2.	Modern Construction Practices	15	Internal/External
3.	E-Tabs Applications	15	Internal/External
4.	CPM & PERT	15	Internal/External
5.	Soil Interaction	15	Internal/External
6.	Materials Management	15	Internal/External
7.	Water Harvesting &Management	15	Internal/External
8.	Energy Engineering	15	Internal/External
9.	Solid waste management	15	Internal/External
10	Sustainable Engineering practices	15	Internal/External
11.	Intellectual Property Rights	15	Internal/External
12.	Engineering Economics & Cost analysis	15	Internal/External
13.	Value Engineering	15	Internal/External
14.	Optimization techniques	15	Internal/External
15.	Finite element method	15	Internal/External

COURSE COMPONENT SUMMARY

S.No	Subject Area	Credits per semester								Credits Total	% of Credits
		I	II	III	IV	V	VI	VII	VIII		
1	HSC	3	3			3				9	5.63
2	BSC	8	8	4	4					24	15.00
3	ESC	5	7	9			1	1		23	14.37
4	PCC			8	19	20	12	3	3	65	40.63
5	PEC						3	6	6	15	9.37
6	OEC						6	6		12	7.50
7	EEC						1	5	6	12	7.50
8	MC	0	0					0		0	0
Total		**16**	**18**	**21**	**23**	**23**	**23**	**21**	**15**	**160**	**100**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - I

		L	T	P	C
20EN151	**TECHNICAL ENGLISH – I** (Common to all branches)	2	0	1	3

Prerequisite: *No prerequisites are needed for enrolling into the course*

Course Objectives : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Comprehend and apply Grammar in context for professional communication*	*Understand*
CO2:	*Infer the gist and specific information.*	*Apply*
CO3:	*Discuss, express and interact in the society and place of study.*	*Create*
CO4:	*Critically interpret and comprehend a given text.*	*Evaluate*
CO5:	*Prioritize the listening skills for academic and professional purposes.*	*Apply*

UNIT - I **[09]**

Synonyms & Antonyms –- Use of Modal Auxiliaries – Infinitive and Gerund –-Parts of Speech -Intensive Reading – Predicting Content – Interpretation - Active Listening - Listening for the main idea - Need based Correspondence (request for joining hostel, bonafide certificate)-Self Introduction- Introducing others

UNIT - II **[09]**

British & American Terminology — Tenses (Simple Present, Present Continuous, Present Perfect, Simple Past, and Simple Future) -Predicting Content - Drawing inferences - Listening for specific details - Listening to News – Job Application and Resume – Writing Instructions- Delivering Welcome Address

UNIT - III **[09]**

Standard Abbreviations and Acronyms -Preposition of Time, Place and Movement – Active Voice & Passive Voice – Consonant Sounds – Pronunciation guidelines related to Vowels and Consonant – Skimming & Scanning - Inference – Context Based Meaning – Recommendation Writing - Proposing Vote of Thanks.

UNIT - IV **[09]**

Vocabulary Building – Phrasal Verbs (Put, Give, Look, Take, Get, Call)- Impersonal passive -Newspaper Reading — Note making – Listening to Dialogues – E Mail Etiquettes & E-mail Writing.- MoC – Anchoring – Role play in academic context

UNIT - V **[09]**

Homonyms - Concord (Subject & Verb Agreement)- Rearranging the jumbled sentences - Listening to Telephonic Conversation - Letter of Invitation (inviting, accepting and declining) – Paragraph writing - Letter to the Editor of a News paper – Drills using Minimal pairs – Presentation Skills.

Total (L= 40, T = 5) = 45 Periods

Text Books :

1 Meenakshi Raman, Technical Communication, Oxford University Press, New Delhi, First Edition, 2017
2 S.Sumant, Technical English – I, Vijay Nicole, Chennai, Second Edition, 2018

Reference Books :

1 Dr.P.Rathna, English Work Book – I, VRB Publishers Pvt. Ltd., Chennai, Second Edition,2018
2 Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, First Edition, 2016
3 M Ashra Rizvi, Effective Technical Communication, Tata McGraw Hill, New Delhi, First Edition,2005
4 P.Kiranmani Dutt, A course in Communication Skills, Cambridge University Press, New Delhi, First Edition, 2014

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Comprehend and apply Grammar in context for professional communication.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	*Infer the gist and specific information.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO3	*Discuss, express and interact in the society and place of study.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	*Critically interpret and comprehend a given text.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO5	*Prioritize the listening skills for academic and professional purposes.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
	Average	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**2**	**3**	**-**	**1**	-	**-**

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

Course Faculty ***Module Coordinator*** **Chairman BOS /S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – I

		L	T	P	C
20MA151	**ENGINEERING MATHEMATICS – I** (Common to All Branches)	3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Interpret the concepts of Matrix applications in the field of engineering.*	*Understand*
CO2:	*Acquire knowledge in solving ordinary differential equations.*	*Evaluate*
CO3:	*Extend and apply the concepts of differential calculus problems.*	*Apply*
CO4:	*Develop the skills in solving the functions of several variables.*	*Remember*
CO5:	*Applying the concepts and solving the Vector Calculus problems.*	*Apply*

UNIT– I LINEAR ALGEBRA [12]

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (Excluding proof) – Cayley Hamilton theorem (excluding proof) – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT – II ORDINARY DIFFERENTIAL EQUATIONS [12]

Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy's and Legendre's linear equations – Method of variation of parameters.

UNIT – III DIFFERENTIAL CALCULUS [12]

Curvature – Radius of curvature (Cartesian co-ordinates only) – Centre of curvature and Circle of curvature – Involutes and Evolutes.

UNIT – IV FUNCTIONS OF SEVERAL VARIABLES [12]

Partial derivatives – Total derivatives – Euler's theorem for homogenous functions – Taylor's series expansion – Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.

UNIT – V VECTOR CALCULUS [12]

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Green's theorem in plane, Gauss divergence theorem and Stoke's theorem – Problems in Cube, Cuboid and Rectangular parallelopiped only.

Total (L: 45 T:15) = 60 Periods

Text Books :

1. Ravish R Singh and Mukul Bhatt, Engineering Mathematics – I, McGraw Hill Publications, Fourth Edition, New Delhi 2016.
2. Grewal B.S, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, Forty Third Edition, New Delhi, 2015.

Reference Books :

1. Bali N. P and Manish Goyal, Textbook on Engineering Mathematics, Laxmi Publications (p) Ltd., Seventh Edition, 2016.
2. H.K. Dass, Advance Engineering Mathematics, S. Chand and company, Eleventh Edition, 2015.
3. Jain R.K. and Iyengar S.R.K., - Advanced Engineering Mathematics, Narosa Publications, Eighth Edition, 2012.
4. Narayanan.S and Manicavachagom Pillai. T.K. – Calculas vol I and Vol II, S.Chand & Co. Sixth Edition, 2014.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Interpret the concepts of Matrix applications in the field of engineering.*	3	3	3	3										
CO2	*Acquire knowledge in solving ordinary differential equations.*	3	3	3	3										
CO3	*Extend and apply the concepts of differential calculus problems.*	3	3	3	3										
CO4	*Develop the skills in solving the functions of several variables.*	3	3	3	3										
CO5	*Applying the concepts and solving the Vector Calculus problems.*	3	3	3	3										
	Average	3	3	3	**3**										

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

Course Faculty ***Module Coordinator*** **Chairman BOS /S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – I

20CH051	**ENGINEERING CHEMISTRY** (Common to All Branches)	L	T	P	C
		3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Make use of the manufacture, properties and uses of advanced engineering materials.*	*Understand*
CO2:	*Explain the concept of corrosion and its control.*	*Understand*
CO3:	*Use the concept of thermodynamics in engineering applications.*	*Understand*
CO4:	*Recall the periodic properties such as ionization energy, electron affinity and electro negativity.*	*Remember*
CO5:	*Analyze the usage of various spectroscopic techniques.*	*Understand*

UNIT - I ADVANCED ENGINEERING MATERIALS [9]

Abrasives – Moh's scale of hardness – types – natural [Diamond] – synthetic [SiC]; Refractories – characteristics – classifications [Acidic, basic and neutral refractories] – properties – refractoriness – RUL – porosity – thermal spalling; Lubricants – definition – function – characteristics – properties – viscosity index, flash and fire points, cloud and pour points, oiliness; Solid lubricants – graphite and MoS_2; Nano materials – CNT– synthesis [CVD, laser evaporation, pyrolysis] – applications – medicine, electronics, biomaterials and environment.

UNIT - II ELECTROCHEMISTRY AND CORROSION [9]

Introduction – electrode potential – Nernst equation – EMF series and its significance – types of cells (Electrolytic & electrochemical); Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control – corrosion inhibitors.

UNIT - III CHEMICAL THERMODYNAMICS [9]

Terminology of thermodynamics – second law; Entropy – entropy change for an ideal gas – reversible and irreversible processes – entropy of phase transition – Clausius inequality; Free energy and work function – Helmholtz and Gibb's free energy functions – criteria of spontaneity; Gibb's – Helmholtz equation (Problems); Maxwell's relations – Van't Hoff isotherm and isochore.

UNIT - IV ATOMIC STRUCTURE AND CHEMICAL BONDING [9]

Effective nuclear charge – orbitals – variations of s, p, d and f orbital – electronic configurations – ionization energy – electron affinity and electro negativity; Types of bonding – ionic, covalent and coordination bonding – hydrogen bonding and its types; Crystal field theory – the energy level diagram for transition metal complexes ($[Fe(CN)_6]^{3-}$, $[Ni(CN)_4]^{2-}$ and $[CoCl_4]^{2-}$ only); Role of transition metal ions in biological system; Band theory of solids.

UNIT - V PHOTOCHEMISTRY AND SPECTROSCOPIC TECHNIQUES [9]

Laws of photochemistry – Grotthuss Draper law – Stark-Einstein law – Beer-Lambert law – phosphorescence – fluorescence and it's applications in medicine – chemiluminescence; Colorimetry – principle – instrumentation (block diagram only) – estimation of iron by colorimetry; principles of spectroscopy – selection rules – vibrational and rotational spectroscopy – applications; Flame photometry – principle – instrumentation (block diagram only) – estimation of sodium; Atomic absorption spectroscopy – principle – instrumentation (block diagram only) – estimation of nickel.

Total = 45 Periods

Text Book :

1 Dr. A.Ravikrishnan, Engineering Chemistry, Srikrishna Hi-tech Publishing Company Private Limited,Chennai, Seventeenth Edition, 2016.

2 P.C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing company, New Delhi, Seventeenth Edition, 2015.

Reference Books :

1 S S. Dara and S. S. Umare, A Text book of Engineering Chemistry, S.Chand &Company Limited, New Delhi, Fifth Edition, 2015.

2 N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, PHI Learning Private Limited, New Delhi, Third Edition, 2014.

3 S. Vairam, P. Kalyani and Suba Ramesh, Engineering Chemistry, Wiley India Private Limited, New Delhi, First Edition, 2013.

4 B. Sivasankar, Engineering Chemistry, Tata McGraw – Hill Education Private Limited, New Delhi, First Edition, 2008.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Make use of the manufacture, properties and uses of advanced engineering materials.*	3	3	2				2					1		
CO2	*Explain the concept of corrosion and its control.*	3	3	2				3					2		
CO3	*Use the concept of thermodynamics in engineering applications.*	3	3	2				2					2		
CO4	*Recall the periodic properties such as ionization energy, electron affinity and electro negativity.*	3	3	2				2					1		
CO5	*Analyze the usage of various spectroscopic techniques.*	3	3	2				3					1		
	Average	**3**	**3**	**2**				**2**					**1**		

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

Course Faculty ***Module Coordinator*** **Chairman BOS /S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – I

		L	T	P	C
20EE041	**BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING** (Common To AU,CE,CS,IT,ME&SF)	3	0	0	3

Prerequisite: *Engineering Mathematics, Engineering Physics*

Course Outcomes : On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Solve the electric circuits by applying basic circuital laws for various combinations of circuit elements.*	*Apply*
CO2:	*Explain the construction, operating principle and application of DC motor and transformers.*	*Understand*
CO3:	*Enlighten the construction, operating principle and application of AC motors and Special Machines.*	*Understand*
CO4:	*Illustrate the function of various measuring instruments.*	*Understand*
CO5:	*Discuss the characteristics of Diodes, BJT and Digital systems.*	*Understand*

UNIT – I ELECTRICAL CIRCUITS [09]

Structural of Electrical Power System – Ohm's Law – Kirchhoff's Laws – Circuit Analysis – Introduction to AC Circuits: R, RL & RLC series circuits, Average and RMS Value – Power and Power factor for single phase Circuits – Three Phase Star and Delta Connections–Electrical safety.

UNIT –II DC MOTOR AND TRANSFORMERS [09]

Faraday's Law – Lenz's Law – Fleming's left hand and right hand rule, DC Motor: Construction –Operation-series and shunt motor Characteristics Applications. Single Phase Transformer: Construction – Operation – EMF Equation – Types – Applications.

UNIT –III AC MOTORS & SPECIAL MACHINES [09]

Single Phase Induction Motor: Construction – Operation – Split Phase Induction Motor and Capacitor Start Induction Run Motor – Applications, Three Phase Induction Motor: Construction – Operation – Types – Applications. Special Machines: Stepper Motor.

UNIT–IV MEASURING INSTRUMENTS [09]

Basic Methods of Measurements: Direct and Indirect, Functional elements of an instrument – Errors in measurements– Analog and Digital Instruments – Basic Principle of Indicating Instruments – Moving Coil and Moving Iron Ammeter and Voltmeter. Dynamometer type Wattmeter – Induction type Energy Meter – Cathode Ray Oscilloscope.

UNIT – V ANALOG AND DIGITAL ELECTRONICS [09]

Semiconductor devices: PN Junction Diode, Zener diode: Operation and Characteristics– Bipolar Junction Transistor – CE Configurations and its Characteristics. Review of number systems – Digital logic gates – Introduction to Microprocessors.

Total = 45 Periods

Text Books :

1. Smarajit Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI Learning Private Limited, New Delhi, Second Edition, 2007.
2. Jegathesan, V, VinothKumar, K.,Saravanakumar, R., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, First Edition, 2012.

Reference Books :

1. Muthusubramanian, R., Salivahanan, S., and Muraleedharan, K.A., Basic Electrical, Electronics and Computer Engineering, Tata Mc Graw Hill, New Delhi, Second Edition, 2006.
2. Nagsarkar, T.K., and Sukhija M.S.,Basics of Electrical Engineering, Oxford University Press, New Delhi, Ninth Edition, 2005.
3. Mehta, V.K and Rohit Mehta, Principle of Electrical Engineering, S Chand & Company, New Delhi, Second Edition, 2008.
4. Mahmood Nahvi and Joseph A. Edminister, Electric Circuits, Schaum Outline Series, McGraw Hill, New Delhi, Fifth Edition, 2002.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	*Solve the electric circuits by applying basic circuital laws for various combinations of circuit elements.*	3	2	2	-	-	-	-	-	-	-	-	1	-	-
CO2:	*Explain the construction, operating principle and application of DC motor and transformers.*	3	3	2	-	-	2	1	1	-	-	-	1	-	-
CO3:	*Enlighten the construction, operating principle and application of AC motors and Special Machines.*	3	2	2	-	-	2	1	1	-	-	-	1	-	-
CO4:	*Illustrate the function of various measuring instruments.*	3	3	2	-	-	2	1	1	-	-	-	1	-	-
CO5:	*Discuss the characteristics of Diodes, BJT and Digital systems.*	3	3	2	-	-	2	1	1	-	-	-	1	-	-
	Average	**3**	**3**	**2**	**-**	**-**	**2**	**1**	**1**		-	-	**1**	**-**	-

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

Course Faculty **Module Coordinator** **Chairman BoS / EEE**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – I

		L	T	P	C
20CH028	**CHEMISTRY LABORATORY** (Common To All Branches)	0	0	3	1

Prerequisite:-

Course Outcomes: On Completion of this course, the student will be able to

		Cognitive level
CO1:	*Apply the principle of conductometric titration.*	*Understand*
CO2:	*Relate the role of pH in quantitative analysis of a solution.*	*Understand*
CO3:	*Perceive the knowledge of the concentration of Iron by electrochemical methods.*	*Understand*
CO4:	*Analyze the application of water in various fields.*	*Understand*
CO5:	*Recall the nature of corrosion process.*	*Remember*

LIST OF EXPERIMENTS:

1. Conductometric Titration – Strong Acid Vs. Strong Base.
2. Conductometric Titration – Mixture of Weak and Strong Acids Vs. Strong Base.
3. Conductometric Titration – Precipitation, $BaCl_2$ Vs. Na_2SO_4.
4. Estimation of Ferrous ion by Potentiometry – Fe^{2+} Vs $K_2Cr_2O_7$.
5. Estimation of Hydrochloric Acid by pH metry.
6. Estimation of Iron by Spectrophotometry.
7. Estimation of hardness in water by EDTA method.
8. Estimation of chloride in water sample by Argentometry.
9. Estimation of dissolved oxygen (DO) in water by Winkler's method.
10. Determination of rate of corrosion of mild steel by weight loss method.

Total : 30 Periods

Text Book :

1. Department of Chemistry Staff members, Chemistry Laboratory Manual, K.S.R. College of Engineering, Tiruchengode, Fourth Edition, 2020.
2. I. Vogel, Vogel's Textbook of Quantitative Chemical Analysis, John Wiley & sons, New York, Eighth Edition, 2014.

Reference Books :

1. S. K. Bhasin and Sudha Rani, Laboratory Manual of Engineering Chemistry, Dhanpat Rai Publishing Company Private Limited, New Delhi, Third Edition, 2012.
2. I. Vogel and J. Mendham, Vogel's Textbook of Quantitative Chemical Analysis, Harlow, Prentice Hall, Sixth Edition, 2000.
3. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny, Vogel's Text book of quantitative analysis chemical analysis, Longman, Singapore publishers, Singapore, ELBS Fifth Edition, 1996.
4. B.S. Furniss, A.J, Hannaford, P.W.G. Smith and A.R.Tatchel, Vogels Textbook of Practical organic chemistry, John Wiley & sons, New York, Fifth Edition, 1989.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Apply the principle of conductometric titration.*	3	3	3			2		1	2			1		
CO2	*Relate the role of pH in quantitative analysis of a solution.*	3	2	3			1		1	2			1		
CO3	*Perceive the knowledge of the concentration of Iron by electrochemical methods.*	3	1	3			1		1	2			1		
CO4	*Analyze the application of water in various fields.*	3	2	2			1		1	2			1		
CO5	*Recall the nature of corrosion process.*	3	2	3			1		1	2			1		
	Average	**3**	**2**	**3**			**1**		**1**	**2**			**1**		

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

Course Faculty ***Module Coordinator*** **Chairman BOS /S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - I

		L	T	P	C
20AU127	**ENGINEERING GRAPHICS LABORATORY** (Common To CE,CS,EC,EE, & IT)	0	0	3	1

Prerequisite: -

Course Outcomes: On Completion of this course , the student will be able to		***Cognitive level***
CO1:	*Create and modify two-dimensional drawings using AutoCAD software*	*Understand*
CO2:	*Construct various planes and do orthographic projection of lines and plane surfaces.*	*Remember*
CO3:	*Draw projections of solids and development of surfaces.*	*Understand*
CO4:	*Create the sections of solids and surfaces.*	*Understand*
CO5:	*Sketch two dimensional isometric projections of simple solids.*	*Understand*

List of Experiments:

1. Study of basic tools, commands and coordinate system (absolute, relative, polar, etc.) used in 2D software.
2. Draw the conic curves and special curves by using AutoCAD.
3. Draw the front view, top view, side view of objects from the given pictorial view.
4. Draw the projections of straight lines.
5. Draw the projections of polygonal surface.
6. Draw the projections of simple solid objects.
7. Draw the sectional view and the true shape of the given section.
8. Draw the development of surfaces like prism, pyramids, cylinders and cone.
9. Draw the isometric projections of simple solids, truncated prism and pyramids.
10. Draw the isometric projections of cylinder and cone.

Total : 45 Periods

CO PO MAPPING

CO	**Course Outcomes**	**Programme Outcomes**													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Create and modify two-dimensional drawings using AutoCAD software*	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO2	*Construct various planes and do orthographic projection of lines and plane surfaces.*	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	*Draw projections of solids and development of surfaces.*	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	*Create the sections of solids and surfaces.*	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO5	*Sketch two dimensional isometric projections of simple solids.*	3	3	3	2	2	-	-	-	-	-	-	-	-	-
	Average	**3**	**3**	**3**	2	2	**-**	**-**	**-**	**-**	-	**-**	**-**	**-**	**-**

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

Course Faculty ***Module Coordinator*** ***Chairman BoS***

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – I

		L	T	P	C
20GE028	**MANUFACTURING PRACTICES LABORATORY** (Common to All Branches)	0	0	3	1

Prerequisite: *-*

GROUP A (CIVIL & MECHANICAL)

Course Outcomes: On Completion of this course , the student will be able to ***Cognitive level***

CO1: *Prepare green sand mould for simple patterns and carpentry components with simple joints.*

CO2: *Perform welding practice to join simple structures.*

CO3: *Practice simple operations in lathe and drilling machine.*

LIST OF EXPERIMENTS

1. Study of fitting, smithy, plastic molding, and glass cutting.
2. Prepare a mould using solid/split patterns in Foundry.
3. Make Lap joint / Butt joint / T joint from the given wooden pieces using carpentry tools.
4. Make a Butt joint / Lap joint / Tee joints using arc / gas welding equipment.
5. Perform simple Facing and Turning operation using Centre Lathe.
6. Make holes as per the given dimensions using drilling machine.

LIST OF EQUIPMENT

1.	Fitting tools and its accessories	-	15 Sets
2.	Smithy tools and Open hearth furnace setup	-	2 Sets
3.	Foundry tools and its accessories	-	5 Sets
4.	Carpentry tools and its accessories	-	15 Sets
5.	Arc Welding equipments and its accessories	-	5 Sets
6.	Oxy Acetylene welding setup and its accessories	-	1 Set
7.	Centre Lathe with its accessories	-	2 Nos.
8.	Pillar type drilling machine	-	1 No.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Prepare green sand mould for simple patterns and carpentry components with simple joints.*	2	-	-	3	-	-	-	3	1	-	-	3	3	1
CO2	*Perform welding practice to join simple structures.*	2	-	-	3	-	-	-	3	1	-	-	3	3	1
CO3	*Practice simple operations in lathe and drilling machine.*	2	-	-	3	-	-	-	3	1	-	-	3	3	1
	Average	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**3**	**1**			**3**	**3**	**1**

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

Course Faculty ***Module Coordinator*** ***Chairman BoS***

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – I

20GE028 **GROUP B (ELECTRICAL & ELECTRONICS)**
(Common to all Branches)

L	T	P	C
0	0	3	1

Prerequisite: *-*

Course Outcomes: On Completion of this course , the student will be able to ***Cognitive level***

CO1:	*Construct different types of wiring used in house.*	*Understand*
CO2:	*Calibrate single phase Energy meter.*	*Understand*
CO3:	*Demonstrate different electronic components, logic gates and CRO.*	*Understand*

List of Experiments:

ELECTRICAL ENGINEERING

1. Fluorescent lamp wiring & Stair-case wiring.
2. Residential house wiring using switches, fuse, indicator, lamp and fan.
3. Calibration of Single phase Energy meter.

ELECTRONICS ENGINEERING

1. Study of Electronic components and Soldering practice.
2. Study of logic gates AND, OR, EX-OR, NOT, Half and Full Adder.
3. Study of CRO.

Total : 45 Periods

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Construct different types of wiring used in house.*	3	2	3	-	-	-	-	1	1	-	-	3	-	-
CO2	*Calibrate single phase Energy meter.*	3	1	2	-	-	-	-	1	1	-	-	3	-	-
CO3	*Demonstrate different electronic components, logic gates and CRO.*	3	2	3	-	-	-	-	1	1	-	-	3	-	-
	Average	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**3**	**-**	**-**

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

Course Faculty ***Module Coordinator*** ***Chairman BoS***

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER- I

		L	T	P	C
20MC151	**INDUCTION PROGRAMME (COMMON TO ALL BRANCHES)**	0	0	0	0

Course outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Involve in physical activity, creative arts and culture and feel comfortable in the new environment.*	*Understand*
CO2:	*Build relationship between teachers and students and make familiarizing with departments.*	*Understand*
CO3:	*Concentrate on literary activities.*	*Apply*
CO4:	*Develop the required skills through lectures and workshops.*	*Remember*
CO5:	*Acquire skills in extracurricular activities.*	*Analyze*

List of activities during the three weeks Students Induction Programme (SIP): **3 weeks**

MODULE I : PHYSICAL ACTIVITY

- This would involve a daily routine of physical activity with games and sports. There would be games in the evening. These would help develop team work besides health.

MODULE II : CREATIVE ARTS & CULTURE

- Every student would chose one skill related to the arts whether visual arts or performing arts such as painting, music, dance, pottery, sculpture etc. The student would pursue it every day for the duration of the program.
- These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would help in engineering design later.

MODULE III : MENTORING AND CONNECTING THE STUDENTS WITH FACULTY

- Mentoring takes place in the context and setting of *Universal Human Values*. It gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer and take decisions with courage, be aware of relationships and be sensitive to others.
- Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program.

MODULE IV: FAMILIRIZATION WITH COLLEGE/DEPARTMENTS & BRANCHES

- They should be shown their department, and told what it means to get into the branch or department. Describe what role the technology related to their department plays in society and after graduation what role the student would play in society as an engineer in that branch. A lecture by an alumnus of the Dept. would be very helpful in this regard. They should also be shown the laboratories, workshops and other facilities.

MODULE V: LITERARY ACTIVITIES

- Literary activity would encompass reading a book, writing a summary, debating, enacting a play etc.

MODULE VI: PROFICIENCY MODULES:

- The induction program period can be used to overcome some critical lacunas that students might have difficulties in communication skills. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially.

MODULE VII: LECTURES & WORKSHOPS

- Lectures by eminent people to be organized, say, once a week. It would give the students exposure to people who are eminent, in industry or engineering, in social service, or in public life. Alumni could be invited as well.
- Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, Vivekanand Kendras, S-VYASA, etc. may be organized. (3 sessions, 9 hours).

MODULE VIII: EXTRA CURRICULAR ACTIVITIES

- The new students should be introduced to the extra-curricular activities at the college.
- They should be shown the facilities and informed about activities related to different clubs etc. This is when selected senior students involved in or leading these activities can give presentations, under faculty supervision.

MODULE IX: FEED BACK & REPORT ON THE PROGRAMMES:

- Students should be asked to give their mid-program feedback. They should be asked to write their opinions about the program at the end of the first week.
- Finally, at the end of the program, each group (of 20 students) should be asked to prepare a single report on their experiences of the program. On the second last day, each group should present their report in front of other groups. Immediately after their presentation, they should submit their written report. This will also serve as a *closure* to the program.
- Finally, a formal written or online anonymous feedback should be collected at the end of the program.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Involve in physical activity, creative arts and culture and feel comfortable in the new environment.*	3					3	3	2	3	2		3		
CO2	*Build relationship between teachers and students and make familiarizing with departments.*	3					3	3	3	1	3		3		
CO3	*Concentrate on literary activities.*	3					2	3	3	3	3		3		
CO4	*Develop the required skills through lectures and workshops.*	3					3	3	3	2	3		3		
CO5	*Acquire skills in extracurricular activities.*	3					3	3	3	3	3		3		
	Average	**3**					**3**	**3**	**3**	**2**	**3**		**3**		

Course Faculty ***Module Coordinator*** ***Chairman/ S&H***

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - II

		L	T	P	C
20EN251	**TECHNICAL ENGLISH – II** (common to all branches)	2	0	1	3

Prerequisite: *No prerequisites are needed for enrolling into the course*

Course Objectives : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Infer and apply the enriched vocabulary, by knowing the basic grammatical structure, in academic and professional contexts.*	*Understand*
CO2:	*Identify and use Standard English in diverse situations.*	*Apply*
CO3:	*Interpret by reading a text and comprehend a given text.*	*Create*
CO4:	*Organize and compose business letters.*	*Evaluate*
CO5:	*Prioritize the listening skill for academic and personal development purposes.*	*Apply*

UNIT - I **[09]**

Technical Vocabulary – Changing words from one form to another - Articles – Compound Nouns - Introducing Oneself – Biased Listening- Critical reading - Need based Correspondence (In plant training & Industrial Visit) - Context based meaning - Writing short Essays.

UNIT - II **[09]**

Prefixes & Suffixes - Numerical Adjectives – If Conditionals – Making Requests – Seeking Information - Listening for main ideas –Intensive Reading - E-mail Writing– Describing Likes & Dislikes - Report Writing.

UNIT - III **[09]**

Types of Collocations - Framing Questions – 'Wh' Question – Yes / No Question –Cause and Effect Expression - Greetings and Introductions — Inviting People - Listening and Note taking - Critical reading- Making inference - Transcoding (Interpretation of Charts).

UNIT - IV **[09]**

Common English idioms and phrases - Expression of Purpose – Editing text for Spelling and Punctuation - Oral Presentation – Extensive Listening - Short Comprehension Passages - Business Correspondence – Calling for Quotations, Seeking Clarification, placing order and Complaint .

UNIT - V **[09]**

Confused and misused words - Discourse markers – Redundancies - Instructions – Describing – Listening to fill up forms and gapped texts - Reading Short texts from Journals and Newspapers - Telephone Etiquette - Check list – Essay Writing.

Total (L= 40, T = 5) = 45 Periods

Text Books :

1 Dr.S.Sumant, Technical English II, Tata McGraw Hill, New Delhi, Second Edition, 2016

2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2004.

Reference Books :

1 Michael Swan, Practical English Usage, Oxford University Press, New Delhi, First Edition, 2015.

2 Dept. of Humanities and social sciences, Anna University, Chennai, English for Engineers and Technologists, Orient Longman, First Edition, 2014

3 Hory Sankar Mukerjee, Business Communication, Oxford University Press, New Delhi, First Edition, 2013.

4 Department of English, English for Technologists and Engineers, Orient Black Swan, Chennai, First Edition, 2016

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Infer and apply the enriched vocabulary, by knowing the basic grammatical structure, in academic and professional contexts.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	*Identify and use Standard English in diverse situations.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO3	*Interpret by reading a text and comprehend a given text.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	*Organize and compose business letters.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO5	*Prioritize the listening skill for academic and personal development purposes.*	-	-	-	-	-	-	-	-	2	3	-	1	-	-
	Average	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**2**	**3**	**-**	**1**	-	**-**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/ S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – II

		L	T	P	C
20MA241	**ENGINEERING MATHEMATICS – II** (COMMON TO AU, CE, ME& SF)	3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Apply the concepts of analytic functions, conformal mapping and bilinear transformations.*	*Remember*
CO2:	*Solve the of Complex Integration problems.*	*Understand*
CO3:	*Solve the Fourier series problems.*	*Understand*
CO4:	*Analyze the partial differential equations and its applications.*	*Remember*
CO5:	*Apply Laplace transform, Inverse Laplace transform in the Engineering fields.*	*Apply*

UNIT - I ANALYTIC FUNCTIONS [12]

Functions of a complex variable – Analytic functions – Necessary and sufficient conditions: Cauchy – Riemann Equation (excluding proof) – Harmonic functions – Construction of analytic functions (Milne Thomson method) – Conformal mapping: w = z+c, cz, 1/z and bilinear transformation.

UNIT - II COMPLEX INTEGRATION [12]

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Laurent's series expansion – Singular points – Residues – Cauchy's residue theorem – Evaluation of real and definite integrals on unit circle and semi – circular contour (excluding poles on boundaries).

UNIT - III FOURIER SERIES [12]

Dirichlet's conditions – General Fourier series - Odd and Even functions – Half range sine and cosine series – Harmonic analysis.

UNIT - IV PARTIAL DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS [12]

Formation of partial differential equations – Lagrange's linear equation - Solutions of one dimensional wave equation – Problems on vibrating string with zero and non - zero initial velocity – One dimensional heat equation – Problems of steady state condition with zero and non- zero boundary values.

UNIT - V LAPLACE TRANSFORMATION [12]

Laplace transforms – Conditions for existence – Transform of elementary functions – Basic properties– Transform of Derivatives – Initial and final value theorems (excluding proof). Transform of periodic functions. Inverse Laplace transforms (partial fraction method only) – Solution of linear ordinary differential equations of second order with constant coefficients.

Total (L: 45 T:15) = 60 Periods

Text Books :

1. Ravish R Singh and Mukul Bhatt, Engineering Mathematics - II, McGraw Hill Publications, New Delhi, Third Edition,2016.
2. Grewal B.S, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, Forty third Edition, New Delhi, 2015.

Reference Books :

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India, New Delhi, Seventh Edition, 2016.
2. Bali N.P and Manish Goyal, Engineering Mathematics, Laxmi Pub, Chennai, Seventh Edition, 2016
3. P. Anuradha and V. Sudhakar, Transforms and Partial Differential Equations, Scitech publication, Chennai, Second Edition, 2014.
4. Lan Sneddon, Elements of Partial Differential Equations, McGraw-Hill International Editions, New Delhi, Thirty Fifth edition, 2012.

CO PO MAPPING

CO's	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Apply the concepts of analytic functions, conformal mapping and bilinear transformations.*	3	3	3	3										
CO2	*Solve the of Complex Integration problems.*	3	3	3	3										
CO3	*Solve the Fourier series problems.*	3	3	3	3										
CO4	*Analyze the partial differential equations and its applications.*	3	3	3	3										
CO5	*Apply Laplace transform, Inverse Laplace transform in the Engineering fields.*	3	3	3	3										
	Average	3	3	3	3										

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

Course Faculty ***Module Coordinator*** **Chairman BOS /S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – II

		L	T	P	C
20PH051	**ENGINEERING PHYSICS** (Common to All Branches)	3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course , the student will be able to		***Cognitive level***
CO1:	*Describe the impact of engineering solutions in the constructional and designing environment.*	*Remember*
CO2:	*Categorize the types of laser and utilize it for specific application based on their desirable requisite.*	*Analyze*
CO3:	*Utilize the conceived concepts and techniques for synthesizing novel crystals with enhanced multifunctional properties.*	*Apply*
CO4:	*Enumerate the preambles of quantum physics and implement its concepts to tackle the cumbersome engineering problems.*	*Apply*
CO5:	*Comprehend the fundamental ideas of optoelectronic materials and to fabricate it for the potential applications*	*Understand*

UNIT – I ACOUSTICS AND ULTRASONICS [9]

Acoustics–Introduction – Classification of sound – Characteristics of musical sound – Loudness – Weber – Fechner law – Decibel – Absorption coefficient – Reverberation – Reverberation time – Sabine's formula: growth and decay (derivation) – Factors affecting acoustics of buildings and their remedies. Ultrasonics – Production –piezoelectric method – Properties – Velocity measurement: acoustical grating –Engineering applications– SONAR.

UNIT – II LASER TECHNOLOGY [9]

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion, pumping – Einstein's A and B coefficients (derivation). Types of lasers – Nd-YAG, CO_2 and Semiconductor lasers (homo-junction and hetero-junction) – Qualitative Industrial Applications: Lasers in welding, heat treatment and cutting – Medical applications – Holography (construction and reconstruction of images).

UNIT – III CRYSTAL PHYSICS [9]

Introduction to crystalline and amorphous solids – lattice and unit cell – seven crystal system and Bravais lattices – Miller indices(hkl) –d-spacing in cubic lattice – atomic radius – coordination number – packing factor calculation for sc, bcc, fcc and hcp– crystal defects – point, line and surface defects.

UNIT – IV QUANTUM PHYSICS [9]

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect - Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box.

UNIT – V OPTOELECTRONIC DEVICES [9]

Photoconductive materials – Light Dependent Resistor (LDR) – Working – Applications – Photovoltaic materials – Solar cell – Construction, working and applications – Light Emitting Diode (LED) – Principle, construction and working - Liquid crystal Display (LCD) – Types and applications.

Total = 45 Periods

Text Books :

1 M.N. Avadhanulu and P.G. Kshirsagar, A text book of Engineering Physics, S. Chand and Company, New Delhi, seventh Edition, 2014.

2 R.K.Gaur&S.L.Gupta, Engineering Physics, Dhanpat Rai Publication, New Delhi, seventh Edition, 2014.

Reference Books :

1 D. Halliday, R. Resnick and J. Walker, Fundamentals of Physics, John Wiley & sons, USA, nineth Edition, 2011.

2 V. Rajendran, Engineering Physics, Tata McGraw Hill, New Delhi, first Edition, 2011.

3 R. A. Serway and J. W. Jewett, Physics for Scientists and Engineers with Modern Physics, nineth edition, Cengage Learning, USA, 2013.

4 Arthur Beiser, Concepts of Modern Physics, Tata McGraw Hill, New Delhi, sixth Edition, 2010.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Describe the impact of engineering solutions in the constructional and designing environment.*	3	3			2			1		2		2		
CO2	*Categorize the types of laser and utilize it for specific application based on their desirable requisite.*	3	3			2			1		2		2		
CO3	*Utilize the conceived concepts and techniques for synthesizing novel crystals with enhanced multifunctional properties.*	3	3			2			1		2		2		
CO4	*Enumerate the preambles of quantum physics and implement its concepts to tackle the cumbersome engineering problems.*	3	3			2			1		2		2		
CO5	*Comprehend the fundamental ideas of optoelectronic materials and to fabricate it for the potential applications*	3	3			2			1		2		2		
	Average	3	3			2			1		2		2		

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

Course Faculty ***Module Coordinator*** **Chairman BOS /S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – II

		L	T	P	C
20CS241	**PYTHON PROGRAMMING** (Common to AU, CE, EE, EC, ME & SF)	3	0	0	3

Prerequisite: *Basic knowledge of C programming.*

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Illustrate basic concepts of python programming.*	*Understand*
CO2:	*Apply the necessary data structures includes list, tuple and dictionary in the required fields.*	*Apply*
CO3:	*Analyze, design and implement the problems using OOPs technology*	*Analyze*
CO4:	*Demonstrate the simple file operations*	*Evaluate*
CO5:	*Design web site using GUI.*	*Create*

UNIT – I FUNDAMENTALS OF PYTHON [9]

Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – I/O function – Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.

UNIT – II DATA STRUCTURES AND PACKAGES [9]

Strings – List – Tuples – Dictionaries – Sets – Exception Handling: Built-in Exceptions – User-defined exception– Modules and Packages.

UNIT – III OBJECT ORIENTED PROGRAMMING [9]

Object Oriented Programming basics – Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling – Duck Typing – Relationships.

UNIT – IV FILES AND DATA BASES [9]

File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using Oracle, MySQL and SQLite.

UNIT – V GUI AND WEB [9]

UI design: Tkinter – Events – Socket Programming – Sending email – CGI: Introduction to CGI Programming, GET and POST Methods, File Upload.

Total = 45 Periods

Text Books :

1 Mark Lutz, “Learning Python”, O'Reilly Media, Fifth Edition, 2013

2 Wesley J.Chun, “Core Python Programming”, Pearson Education, Second Edition, 2017

References :

1 Bill Lubanovic, "Introducing Python Modern Computing in Simple Packages", O'Reilly Media, First Edition, 2014.

2 David Beazley, Brian K. Jones, "Python Cookbook", O'Reilly Media, Third Edition, 2013

3 Mark Lutz, “Python Pocket Reference”, O'Reilly Media, Fifth Edition, 2014

4 www.python.org and www.diveintopython3.net

5 To practice: www.codeacademy.com and https://codingbat.com/python

CO-PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	*Illustrate basic concepts of python programming.*	3	3	2	2	1				1			1		
CO2:	*Apply the necessary data structures includes list, tuple and dictionary in the required fields.*	3	3	3	2	2				1			1		
CO3:	*Analyze, design and implement the problems using OOPs technology*	3	3	3	2	2				1			1		
CO4:	*Demonstrate the simple file operations*	3	3	3	3	2				1			1		
CO5:	*Design web site using GUI.*	3	3	3	3	2				1			1		
	Average	**3**	**3**	**3**	**2**	**2**				**1**			**1**		

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – II

		L	T	P	C
20CE231	**ENGINEERING MECHANICS**	3	0	0	3

Prerequisite: *-*

Course Outcomes : On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Solve for the resultants of any force system and determine equivalent force system*	*Understand*
CO2:	*Analyze the moment acting on a body due to force and couples*	*Analyse*
CO3:	*Calculate the centroid, first moment and second moment of area*	*Understand*
CO4:	*Solve the problems on kinematics of particles and kinematics of rigid*	*Analyse*
CO5:	*Analyze the phenomenon of friction and solve problem related to the same*	*Analyse*

UNIT - I BASICS & STATICS OF PARTICLES [9]

Introduction – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Coplanar Concurrent Forces – Resolution and Composition of forces – Equilibrium of a particle in 2D & 3D – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT - II EQUILIBRIUM OF RIGID BODIES [9]

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions and three dimensions .

UNIT - III PROPERTIES OF SURFACES AND SOLIDS [9]

Centroid - parallel axis theorem and perpendicular axis theorem - First moment of area —Second moment of area –moment and Product of inertia of plane areas -Polar moment of inertia –Principal axes –Mass moment of inertia.

UNIT - IV DYNAMICS OF PARTICLES [9]

Displacements, Velocity and acceleration, their relationship –Relative motion – Curvilinear motion -Newton‟s laws of motion –Work Energy Equation – Impulse and Momentum – Impact of elastic bodies.

UNIT - V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS [9]

Static and Dynamic Friction – Types of friction- Laws of friction – Angle of repose –Translation and Rotation of Rigid Bodies — General Plane motion of simple rigid bodies.

Total (L: 45 T:15) = 60 Periods

Text Books :

1 Bhavikatti, S.S.,Engineering Mechanics, New Age International Publishers, New Delhi, First Edition, 2016.

2 Natesan, S.C.,Engineering Mechanics Statics and Dynamics, Umesh Publications, Naisarak, New Delhi, Third Edition, 2005.

Reference Books :

1 K. Rajasekaran, S. and Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd, New Delhi, Third Edition, 2005.

2 Hibbeller, R.C., Engineering Mechanics Statics and Dynamics, Pearson Education India, New Delhi, Fourteenth Edition, 2017.

3 Dubey, N.H., Engineering Mechanics Statics and Dynamics, Tata McGraw-Hill, New Delhi, First Edition, 2013.

4 Sinha, S.K., Engineering Mechanics Statics and Dynamics, Pearson Education India, New Delhi, First Edition, 2017.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Solve for the resultants of any force system and determine equivalent force system*	3	3	-	3	3	-	-	-	3	-	-	-	-	2
CO2	*Analyze the moment acting on a body due to force and couples*	3	3	-	2	2	-	-	-	3	-	-	-	-	2
CO3	*Calculate the centroid, first moment and second moment of area*	3	2	-	3	3	-	-	-	2	-	-	-	3	3
CO4	*Solve the problems on kinematics of particles and kinematics of rigid*	3	3	-	2	2	-	2	-	2	-	-	-	3	3
CO5	*Analyze the phenomenon of friction and solve problem related to the same*	2	3	-	3	2	-	2	-	3	-	-	-	-	3
Average		**3**	**3**	**-**	**3**	**3**	**-**	**2**	**-**	**3**	**-**	**-**	**-**	**3**	**3**

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

Course Faculty ` *Module Coordinator* Chairman BoS/CIVIL

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – II

		L	T	P	C
20PH028	**PHYSICS LABORATORY** (Common to All Branches)	0	0	3	1

Prerequisite: *-*

Course Outcomes: On Completion of this course , the student will be able to		***Cognitive level***
CO1:	*Comprehend the different physical parameters of optics.*	*Analyse*
CO2:	*Perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid.*	*Remember*
CO3:	*Explore the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.*	*Apply*
CO4:	*Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.*	*Understand*
CO5:	*Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.*	*Analyse*

List of Experiments in Physics Laboratory

1. Determination of wavelength of Laser using grating and the Size of the Particles.
2. Determination of thickness of the given material by Air – wedge method.
3. Determination of velocity of Ultrasonic waves and compressibility using Ultrasonic interferometer.
4. Spectrometer grating - Determination of wavelength of mercury spectrum.
5. Determination of thermal conductivity of a bad conductor by Lee's disc method.
6. Determination of Young's modulus of the material of a uniform bar by Non – Uniform bending method.
7. Determination of Band gap energy of a semiconductor.
8. Determination of Viscosity of a given liquid by Poiseuille's method.
9. Torsional pendulum - Determination of rigidity modulus of a given wire.
10. V-I Characteristics of Solar Cell .

Total : 30 Periods

Text Book :

1. Faculty Members of Physics, Physics Lab manual, Department of Physics, K.S.R. College of Engineering, Namakkal, Seventeenth Edition, 2018.
2. Dr. P. Mani, Physics Lab Manual & Observation Book, Dhanam Publications, Tweleth Edition Chennai 2017.

References :

1. Dr. G. Senthilkumar, Physics Lab manual, VRB Publications Pvt. Ltd., Chennai, Tenth Edition, 2006.
2. R Suresh & Dr. C. Kalyanasundaram, Physics Laboratory, Sri Krishna Hitech Publishing Company Pvt. Ltd., Chennai, Fifth Edition, 2017.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Comprehend the different physical parameters of optics.*	3	3			2			1		2		2		
CO2	*Perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid*	3	3			2			1		2		2		
CO3	*Explore the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.*	3	3			2			1		2		2		
CO4	*Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.*	3	3			2			1		2		2		
CO5	*Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.*	3	3			2			1		2		2		
Average		3	3			2			1		2		2		

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – II

		L	T	P	C
20CS227	**PYTHON PROGRAMMING LABORATORY** (Common to AU, CE, EE, EC, ME & SF)	0	0	3	1

Prerequisite: *Basic knowledge of C programming.*

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Design simple programs using conditionals and loops.*	*Apply*
CO2:	*Write functions to solve mathematical problems.*	*Understand*
CO3:	*Demonstrate the use of files in python.*	*Analyze*
CO4:	*Develop simple applications using python.*	*Create*
CO5:	*Construct GUI applications using python programming.*	*Create*

List of Experiments

1. Write a program to display the largest number among three numbers.
2. Write a program to check the prime number and to display the twin prime numbers.
3. Write a program to display the Fibonacci series and multiplication table by using looping constructs.
4. Write a program for converting decimal to octal, hexadecimals and vice versa by using functions.
5. Write a function to compute the GCD of two numbers.
6. Write a function to perform sorting list of numbers.
7. With the help of string array or list, display a simple calendar in python program without using the calendar module.
8. Demonstrate class and inheritance in python.
9. Create a text file using python file I/O. Read the content of the file and change them from lower to upper case characters. Write the updated content in another file and display it.
10. Write a program to demonstrate the user-defined exception handling mechanism in Python.
11. Design and implement a graphical user interface to perform any arithmetic operation.
12. Write a python program to insert and retrieve data using MySQL.

Total : 45 Periods

CO-PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	*Design simple programs using conditionals and loops.*	2	3	3	2	2				1			1		
CO2:	*Write functions to solve mathematical problems.*	3	3	3	2	2				1			1		
CO3:	*Demonstrate the use of files in python.*	3	3	3	2	2				1			1		
CO4:	*Develop simple applications using python.*	3	3	3	1	3				1			1		
CO5:	*Construct GUI applications using python programming.*	3	3	3	1	3				1			1		
	Average	**3**	**3**	**3**	**2**	**2**				**1**			**1**		

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER –II

20MC052	**ENVIRONMENTAL SCIENCE AND ENGINEERING** (Common to All Branches)	L	T	P	C
		3	0	0	0

Prerequisite: -

Course Outcomes: On Completion of this course , the student will be able to		***Cognitive level***
CO1:	*Interpret the importance in conservation of resources for future generation.*	*Understand*
CO2:	*Relate the importance of ecosystem and biodiversity.*	*Remember*
CO3:	*Analyze the impact of pollution and hazardous waste in a global and societal context.*	*Understand*
CO4:	*Identify the contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems.*	*Understand*
CO5:	*Predict the concept of Sustainability and Green Chemistry.*	*Understand*

UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES [9]

Environment – definition – scope and importance – need for public awareness; Forest resources – use – over exploitation – deforestation; Water resources – over–utilization of surface and ground water; Mineral resources –environmental effects of extracting and using mineral resources; Food resources – overgrazing – effects of modern agriculture – fertilizer–pesticide problems – water logging – salinity; Role of an individual in conservation of natural resources. **Activity:** Slogan making event on conserving natural resources or plantation of trees.

UNIT – II ECOSYSTEM AND BIODIVERSITY [9]

Concept of an ecosystem – structure and function of an ecosystem – producers – consumers and decomposers – Food chain – food web – energy flow in the ecosystem – ecological pyramids – Ecological succession; Forest ecosystem and Aquatic ecosystems (Estuary and marine ecosystem); Biodiversity – introduction – definition – Values of biodiversity; Hot-spots of biodiversity; Endangered and Endemic Species of India. **Activity:** Arrange a trip to visit different varieties of plants.

UNIT– III ENVIRONMENTAL POLLUTION [9]

Pollution – introduction and different types of pollution; Causes – effects and control measures of air pollution and water pollution – water quality parameters – hardness – definition – types; Alkalinity – definition – types; BOD and COD (definition and significance); Noise pollution – solid waste management – hazardous waste – medical and e-wastes; Role of an individual in prevention of pollution. **Activity:** Drive for segregation of waste or cleanliness drive.

UNIT– IV SOCIAL ISSUES AND ENVIRONMENT [9]

Water conservation – rain water harvesting and watershed management; Environmental ethics – Issues and possible solutions; Climate change – global warming and its effects on flora and fauna – acid rain – ozone layer depletion; Disaster Management – earth quake – cyclone – tsunami – disaster preparedness – response and recovery from disaster. **Activity:** Poster making event on water management or Climate change.

UNIT– V SUSTAINABILITY AND GREEN CHEMISTRY [9]

Sustainable development – from unsustainable to sustainable development – Environmental Impact Assessment (EIA); Human rights; Value education; HIV/AIDS; Role of information technology in environment and human health; 12 Principles of Green Chemistry. **Activity:** Group discussion on Sustainability or Lecture from an expert on Green chemistry.

Total = 45 Periods

Text Book :

1 Dr. T. Arun Luiz, Environmental Science and Engineering, S.Chand & Company Private Limited, New Delhi, First Edition, 2016.

2 Anubha Kaushik and C. P. Kaushik, Environmental Science and Engineering, New Age International Publishers, Chennai, Fifth Edition, 2016.

Reference Books :

1 G. Tyler Miller and Scott E. Spoolman, Environmental Science, Cengage Learning India Private Limited, New Delhi, Fourteenth Edition, 2014.

2 Dr. A. Ravikrishnan, Environmental Science and Engineering, Sri Krishna Hi-tech Publishing Company Private Limited, Chennai, Tenth Edition, 2014.

3 Raman Sivakumar, Introduction to Environmental Science and Engineering, Tata McGraw Hill Education Private Limited, Fourth Edition, 2012.

4 S S. Dara, A Text book of Environmental Chemistry and pollution control, S. Chand & Company Limited, New Delhi, Tenth Edition, 2005.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Interpret the importance in conservation of resources for future generation.*	3	2	2			3	3	2				1		
CO2	*Relate the importance of ecosystem and biodiversity.*	3	2	2			3	3	2				1		
CO3	*Analyze the impact of pollution and hazardous waste in a global and societal context.*	3	2	2			3	3	2				1		
CO4	*Identify the contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems.*	3	2	2			3	3	2				1		
CO5	*Predict the concept of Sustainability and Green Chemistry.*	3	2	2			3	3	2				1		
	Average	**3**	**2**	**2**			**3**	**3**	**2**				**1**		

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/ S & H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

		L	T	P	C
20MA331	**ENGINEERING MATHEMATICS - III (B.E. CIVIL ENGINEERING)**	3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course.

Course Outcomes: On Completion of this course , the student will be able to		**Cognitive level**
CO1:	*Testing the hypothesis of the samples and get the inference of the samples obtained from the experiments.*	*Understand*
CO2:	*Solving the non-parametric data and obtain the conclusion of the test.*	*Apply*
CO3:	*Estimating the values by using Regression analysis.*	*Remember*
CO4:	*Evaluating Z-transforms and Difference equations.*	*Evaluate*
CO5:	*Solving the Fourier Transforms problems.*	*Apply*

UNIT - I PARAMETRIC TESTS [12]

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 – Independence of attributes.

UNIT - II NON –PARAMETRIC TESTS [12]

Advantages of Non-Parametric tests – The Sign test, A rank sum test: The Mann-Whitney U test, The Kruskal-Wallis or H-test, One sample Run test- Spearman's Rank Correlation.

UNIT - III CORRELATION AND REGRESSION ANALYSIS [12]

Types of Correlation – Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation- Uses Regression Analysis- Difference between Correlation and Regression Analysis – Regression equation X on Y and Y on X.

UNIT - IV Z TRANSFORMS AND DIFFERENCE EQUATIONS [12]

Z-Transforms - Elementary properties - Inverse Z-Transforms by using Partial Fraction method and Convolution theorem (without proof) - Solutions of difference equations by using Z-Transforms.

UNIT - V FOURIER TRANSFORMS [12]

Fourier integral theorem (without proof) - Fourier Transform pair - Sine and cosine transforms - Properties - Transforms of simple functions - Convolution theorem (without proof).

Total (L: 45 T: 15) = 60 Periods

Text Books :

1 S.P. Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, Forty first edition, 2014

2 Veerarajan.T Engineering Mathematics, Tata McGraw Hill Publications, New Delhi, Third edition, 2015.

Reference Books:

1 Kreyszig. E. Advance Engineering Mathematics, John Wiley and Sons, New Delhi, Eighth edition, 2016.

2 R.S.N. Pillai and Mrs.Bagavathi, Practical Statistics , Sultan Chand, New Delhi, Thirty second edition 2015.

3 Dr. K. Vairamickam, Transforms and Partial Differential Equations , Scitech Publications, Third edition, 2015.

4 Grewal B.S, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, New Delhi, Forty third edition, (2015).

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Testing the hypothesis of the samples and get the inference of the samples obtained from the experiments.*	3	3	3	3										
CO2	*Solving the non-parametric data and obtain the conclusion of the test.*	3	3	3	3										
CO3	*Estimating the values by using Regression analysis.*	3	3	3	3										
CO4	*Evaluating Z-transforms and Difference equations.*	3	3	3	3										
CO5	*Solving the Fourier Transforms problems.*	3	3	3	3										
Average		**3**	**3**	**3**	**3**										

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

Course Faculty ***Module Coordinator*** ***Chairman BoS&H***

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

		L	T	P	C
20CE312	**ENGINEERING GEOLOGY**	3	0	0	3

Prerequisite: -

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Get acquainted with internal structure of earth, natural dynamic processes and their actions. and their importance for civil engineering structures*	*Understand and Remembering*
CO2:	*Identify different types of minerals based on their property*	*Analyze*
CO3:	*Categorize rocks by their origin and engineering properties.*	*Analyze*
CO4:	*Evaluate geological maps, geological structures and interpret the geological exploration methods for suitable site selection.*	*Analyze and Understand*
CO5:	*Know the significance of geological investigations for civil engineering projects and site selection as well as for the preparation of feasibility reports and others.*	*Apply*

UNIT - I PHYSICAL GEOLOGY [9]

Geology in Civil Engineering – Branches of Geology – Earth Structures and Composition – Elementary Knowledge on Continental Drift and Plate Technologies. Earth Processes – Weathering – Work of Rivers, Wind and Sea and their Engineering Importance – Earthquake Belts in India. Groundwater – Mode of Occurrence – Prospecting – Importance in Civil Engineering.

UNIT - II MINERALOGY [9]

Physical Properties of minerals – Quartz group, Feldspar group, Pyroxene - Hypersthene and Augite, Amphibole – Hornblende, Mica – Muscovite and Biotite, Calcite, Gypsum and Clay minerals.

UNIT - III PETROLOGY [9]

Classification of rocks, distinction between igneous, sedimentary and metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT - IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD [9]

Attitude of Beds – Outcrops – Introduction to Geological Maps – Study of Structures – Folds, Faults and Joints – Their Bearing on Engineering Construction. Seismic and Electrical Methods for Civil Engineering Investigations.

UNIT - V GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING [9]

Geological Conditions Necessary for Construction of Reservoirs and Dams, Tunnels, Buildings, Road Cuttings, Land Slides – Causes and Preventions. Sea Erosion and Coastal Protection.

Total (L : 45 T : 0) = 45 Periods

Text Books:

1. Parbin Singh., Engineering and General Geology, S.K. Kataria & Sons, Katson Publishing House, Ludhiana, Reprint 2013.
2. Varghee, P.C., Engineering Geology for Civil Engineers, PHI Learning Private Ltd, New Delhi, First Edition, 2012.

Reference Books:

1. Krynine, D. P. and Judd, W. R., Principles of Engineering Geology and Geotechnics, CBS Publisher, Chennai, First Edition, 2018.
2. Billings Marland. P., Structural Geology, Pearson Education, London, Third Edition, 2016.
3. Chenna Kesavulu N., Textbook of Engineering Geology, Laxmi Publications Pvt Ltd, Bengaluru, Third Edition, 2018.
4. http://nptel.ac.in/courses/105105106/.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Get acquainted with internal structure of earth, natural dynamic processes and their actions. and their importance for civil engineering structures*	2	-	-	-	-	-	-	-	-	-	-	-	2	1
CO2	*Identify different types of minerals based on their property*	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	*Categorize rocks by their origin and engineering properties.*	3	3	1	-	-	-	1	-	-	-	-	1	3	3
CO4	*Evaluate geological maps, geological structures and interpret the geological exploration methods for suitable site selection.*	3	3	1	-	-	2	1	-	-	-	-	1	3	3
CO5	*Know the significance of geological investigations for civil engineering projects and site selection as well as for the preparation of feasibility reports and others.*	3	3	2	-	-	1	1	-	-	-	-	1	3	3
	Average	**3**	**3**	**1**	**-**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**3**	**3**

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

Course Faculty ` Module Coordinator Chairman BoS/CIVIL

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

		L	T	P	C
20CE313	**FLUID MECHANICS**	3	0	0	3

Prerequisite: -

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Solve problems involving fluid properties.*	*Understand*
CO2:	*Derive and apply general governing equations for various fluid flows.*	*Apply*
CO3:	*Determine velocity and fluid flow rates, major and minor losses in pipe flow.*	*Evaluate*
CO4:	*Analyse the concept of boundary layer theory and flow separation.*	*Analyse*
CO5:	*Do the model analysis and similitude distorted models..*	*Apply*

UNIT - I FLUID PROPERTIES AND FLUID STATICS [9]

Fluid – Definition, Distinction between Solid and Fluid – Units and Dimensions – Properties of Fluids – Density, Specific Weight, Specific Volume, Specific Gravity, Temperature, Viscosity, Compressibility, Vapour Pressure, Capillarity and Surface Tension – Fluid Statics: Concept of Fluid Static Pressure, Absolute and Gauge Pressure – Pressure Measurements by Manometers and Pressure Gauges – Forces on Planes – Centre of Pressure – Buoyancy and Floatation

UNIT - II FLUID KINEMATICS AND DYNAMICS [9]

Fluid Kinematics – Flow Visualization – Lines of Flow – Velocity Field and Acceleration – Continuity Equation (1,2 & 3D forms) – Equation of Streamline – Stream Function – Velocity Potential Function – Circulation – Flow Net. Fluid Dynamics – Equations of Motion – Euler's Equation along a Streamline – Bernoulli's Equation – Application – Venturi Meter, Orifice Meter and Pitot Tube, Linear Momentum Equation and its Application.

UNIT - III FLOW THROUGH PIPES [9]

Viscous Flow – Shear Stress, Pressure Gradient Relationship – Laminar Flow between Parallel Plates – Laminar Flow Through Circular Tubes (Hagen Poiseuille's) – Hydraulic and Energy Gradient – Flow Through Pipes – Darcy – Weisbach's Equation – Pipe Roughness – Friction Factor – Moody's Diagram – Major and Minor Losses of Flow in Pipes – Pipes in Series and in Parallel.

UNIT - IV BOUNDARY LAYER [9]

Boundary Layer – Definition – Boundary Layer on a Flat Plate - Thickness and Classification – Displacement, Energy and Momentum Thickness – Boundary Layer Separation and Control - Drag in Flat Plate – Drag and Lift Coefficients.

UNIT - V DIMENSIONAL ANALYSIS AND MODEL STUDIES [9]

Fundamental Dimensions – Dimensional Homogeneity – Rayleigh's Method and Buckingham Pi-Theorem – Dimensionless Parameters – Similitude and Model studies – Distorted Models

Total (L= 45, T = 0) = 45 Periods

Text Books :

1. Bansal, R.K., A Textbook of Fluid Mechanics and Hydraulics Machines, Laxmi Publications Pvt. Ltd., New Delhi, Tenth Edition, 2018.
2. Modi, P.N and Seth, S.M., Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, Twenty First Edition, 2017.

Reference Books :

1. Rajput, R.K., Fluid Mechanics and Hydraulic Machines, S Chand and Company, New Delhi, Sixth Edition, 2016.
2. Hibbeler, R.C., Fluid Mechanics in SI Units, Pearson Education, New Delhi, First Edition, 2017.
3. White, F.M., Fluid Mechanics, McGraw Hill Education India Private Limited, Bengaluru, Eighth Edition, 2017.
4. https://nptel.ac.in/courses/112/104/112104118/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Solve problems involving fluid properties.*	3	3	1	2	-	-	1	-	-	-	-	-	3	3
CO2	*Derive and apply general governing equations for various fluid flows.*	3	3	1	2	-	-	1	-	-	-	-	-	3	3
CO3	*Determine velocity and fluid flow rates, major and minor losses in pipe flow.*	3	3	1	2	-	-	1	-	-	-	-	-	3	3
CO4	*Analyse the concept of boundary layer theory and flow separation.*	3	3	1	2	-	-	1	-	-	-	-	-	3	3
CO5	*Do the model analysis and similitude distorted models.*	3	3	1	2	-	-	1	-	-	-	-	-	3	3
	Average	**3**	**3**	**1**	**2**	-	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**3**	**3**

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

Course Faculty ` Module Coordinator Chairman BoS/CIVIL

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER – III

		L	T	P	C
20CE314	**MECHANICS OF SOLIDS**	3	0	0	3

Prerequisite: Engineering Mechanics

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Apply the fundamental concepts of force-deformation, and stress-strain relationships to the solid and structural mechanics problems.*	*Understand*
CO2:	*Evaluate the principal stress & strain of a stressed member and analyze the behaviour of the trusses subjected to loading.*	*Evaluate*
CO3:	*Develop shear force and bending moment diagrams of a beam and find the maximum shear/ moment and their locations, and get knowledge on theory of simple bending*	*Analyse*
CO4:	*Determine the slope and deflection of beams by using various methods.*	*Analyse*
CO5:	*Analyse shear stress distribution and the effect of torsion in solid and hollow shaft and also about stresses and deflection in springs*	*Analyse*

UNIT - I STRESS,STRAIN AND DEFORMATION OF SOLIDS [12]

Rigid Bodies and Deformable Solids – Stability, Strength, Stiffness – Tension, Compression and Shear Stresses – Strain, Elasticity, Hooke"s Law, Limit of Proportionality, Modulus of Elasticity, Stress-Strain Curve, Lateral Strain – Deformation of Simple and Compound Bars – Temperature Stresses – Shear Modulus, Bulk Modulus, Relationship between Elastic Constants – Volumetric Strain.

UNIT - II COMPLEX STRESSES AND ANALYSIS OF PLANE TRUSSES [12]

Principal Stresses and Principal Planes- Biaxial State of Stress – Stress at a Point – Stress on Inclined Plane – Mohr"s Circle of Stresses. Stability and Equilibrium of Plane Frames – Types of Trusses – Analysis of Forces in Truss Members by Method of Joints, Method of Sections and Method of Tension Coefficients.

UNIT - III TRANSVERSE LOADING ON BEAMS [12]

Beams – Types of Supports – Simple and Fixed, Types of Load – Concentrated, Uniformly Distributed, Uniformly Varying Load, Combination of Above Loading – Relationship between Bending Moment and Shear Force – Bending Moment Diagram and Shear Force Diagram for Cantilever, Simply Supported and Over Hanging Beams. Theory of Simple Bending - Section Modulus - Analysis of Stresses - Load Carrying Capacity of beams

UNIT - IV DEFLECTION OF BEAMS [12]

Slope and Deflection of Beams - Double Integration Method – Macaulay"s Method – Moment Area Method and Conjugate Beam Method

UNIT - V SHEAR STRESSES, TORSION AND SPRINGS [12]

Variation of Shear Stress – Shear Stress Distribution in Rectangular, I Sections, Solid Circular Sections, Hollow Circular Sections, Angle and Channel Sections. Stresses and Deformation in Circular (Solid and Hollow) Shafts – Stepped Shafts. Leaf Springs – Stresses in Helical Springs – Deflection of Springs.

Total (L:45 T:15) = 60 Periods

Text Books :

1 Bansal, R.K.A., Textbook of Strength of Materials, Laxmi Publications, New Delhi, Sixth Edition, 2018.

2 Rajput, R.K., Strength of Materials, S. Chand Publications, New Delhi, Sixth Edition, 2015.

Reference Books :

1 Punmia, B.C. Ashok Kumar Jain. and Arun Kumar Jain., Mechanics of Material, Laxmi Publications, New Delhi, Revised Edition, 2017.

2 Srinath, L.S., Advanced Mechanics of Solids, McGraw Hill Education, Bengaluru, 2010.

3 Egor, P. Popov., Engineering Mechanics of Solids, Pearson Education, New Delhi, Second Edition, 2015.

4 Subramanian, R., Strength of Materials, Oxford University Press, Bengaluru, Third Edition, 2016.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Apply the fundamental concepts of force-deformation, and stress-strain relationships to the solid and structural mechanics problems.*	*3*	*3*	*2*	*-*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*1*	*3*	*3*
CO2	*Evaluate the principal stress & strain of a stressed member and analyze the behaviour of the trusses subjected to loading.*	*3*	*3*	*2*	*-*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*1*	*3*	*3*
CO3	*Develop shear force and bending moment diagrams of a beam and find the maximum shear/ moment and their locations, and get knowledge on theory of simple bending*	*3*	*3*	*2*	*-*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*1*	*3*	*3*
CO4	*Determine the slope and deflection of beams by using various methods.*	*3*	*3*	*2*	*-*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*1*	*3*	*3*
CO5	*Analyse shear stress distribution and the effect of torsion in solid and hollow shaft and also about stresses and deflection in springs*	*3*	*3*	*2*	*-*	*-*	*3*	*-*	*-*	*-*	*-*	*-*	*1*	*3*	*3*
	Average	***3***	***3***	***2***	***-***	***-***	***3***	***-***	***-***	***-***	***-***	***-***	***1***	***3***	***3***

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

Course Faculty ` *Module Coordinator* Chairman BoS/CIVIL

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

		L	T	P	C
20CE315	**SURVEYING**	3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Know how to use surveying instruments and how to find the height, distance of each point, and to prepare profile of the ground and contour maps for Civil Engineering projects.*	*Understand*
CO2:	*Explain the theoretical backgrounds of Theodolite surveying and plan a survey for applications such as road alignment and height of the building.*	*Understand*
CO3:	*Carry out survey for large areas using the concepts of triangulation and trigonometric leveling.*	*Apply*
CO4:	*Estimate measurement errors and apply corrections*	*Apply*
CO5:	Design numerical solutions for carrying out surveying in civil engineering field using *advanced surveying techniques such as remote sensing, GPS, photogrammetry etc.*	*Analyze*

UNIT - I INTRODUCTION TO PLANE SURVEYING AND LEVELLING [9]

Surveying, Classification of Surveys, Linear Measurements with Chain and Tapes, Field Survey by Chains/Tapes, Compass Surveying, True and Magnetic Bearings, Local Attraction, Fore and Back Bearing, Various Types of Compasses and Applications, Detail Plotting, Traverse Using Graphical Approach, Plane Table Accessories, Methods of Plane Table Survey, Contouring, Methods of Levelling, Determination of Height, Booking of Levelling Operation, Types of Levels, Guidelines for Preparation of Contour Maps, Methods of Contouring.

UNIT - II THEODOLITE SURVEY AND CURVES [9]

Theodolites, Measurements of Horizontal and Vertical Angles, Differences in Vernier and Microscopic Theodolites, Methods of Recording Angles, Principle and basic system, Subtensebar, Various Types of Tachometers, plotting with Tacheometers, Curves, Classification, Elements of Simple Circular, Compound, Reverse, Transition, Vertical Curves, Setting of Curves.

UNIT - III TRIGNOMETRICAL LEVELLING [9]

Triangulation, Purpose of Triangulation and Trilateration, Classification, Strength of Figure, Well-Conditioned Triangle, Triangulation Figures, Reconnaissance and Station Selection, Inter Visibility of Stations, Signal and Towers, Base Lining, Computation and Adjustment in Triangulation, Satellite Station, Reduction to centre, Trigonometrical leveling – Single and reciprocal observations.

UNIT - IV SURVEY ERRORS AND ADJUSTMENTS [9]

Sources of Errors, Errors in Chain, Compass and Theodolite Survey, Laws of Accidental Errors, Principles of Least Squares, Laws of Weights, Determination of Probable Error, Distribution of Error of the Field Measurements, Normal Equations, Determination of the Most Probable values, Method of Correlates, Triangulation Adjustments, Figure Adjustment, Adjustment of Geodetic Triangle, Adjustment of Chain of Triangles, Method of Equal Shift.

UNIT - V ADVANCED SURVEYING [9]

Hydrographic Surveying, Soundings, Method of Locating Sounding, EDM - Principles and Applications, Geodimeter, Tellurometer, Distomat etc., Digital Theodolites, Total Station, GPS. Introduction to Photogrammetry, Comparison of Serial Photographs and Topographic Maps, Definition of Basic Terms, Perspective of Near-Vertical Photograph, Scale and Coordinates from Photographs, Stereoscopy, Parallel Bar Measurements, Determination of Heights, Principle of Radial Line Triangulation, Assumption, Limitations and Errors.

Total (L: 45 T: 0) = 45 Periods

Text Books:

1 Punmia, B.C. Ashok Kumar Jain, and Arun Kumar Jain., Surveying and Levelling,Vol.1, and Vol.2, Laxmi Publication, New Delhi, Seventeenth Edition, 2017.
2 Gopi, Satheesh. Sathikumar, R. and Madhu, N., Advanced Surveying: Total Station, GPS, GIS & Remote Sensing, Pearson Education, New Delhi, Second Edition, 2017.

Reference Books:

1 Basak, N.N., Surveying and Levelling, Mc Graw Hill Education Pvt. Ltd, New Delhi, Second Edition, 2017.
2 Bhavikatti, S.S., Surveying and Levelling, Vol. I& II, I K International Publishing House Pvt. Ltd, New Delhi, 2019.
3 Venugopalarao, P. and Vijalakshmi Akella, Text Book of Surveying, PHI Learning, New Delhi, First Edition, 2015.
4 Duggal. S.K., Surveying, Vol. I& II, Mc Graw Hill Education Pvt. Ltd, New Delhi, Fourth Edition, 2017.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Know how to use surveying instruments and how to find the height, distance of each point, and to prepare profile of the ground and contour maps for Civil Engineering projects.*	3	2	1	2	1	2	-	-	-	-	-	2	3	-
CO2	*Explain the theoretical backgrounds of Theodolite surveying and plan a survey for applications such as road alignment and height of the building.*	3	2	1	2	1	2	-	-	-	-	-	2	3	-
CO3	*Carry out survey for large areas using the concepts of triangulation and trigonometric leveling.*	3	2	1	2	1	2	-	-	-	-	-	2	3	-
CO4	*Estimate measurement errors and apply corrections*	3	2	1	2	-	2	-	-	-	-	-	2	3	-
CO5	Design numerical solutions for carrying out surveying in civil engineering field using *advanced surveying techniques such as remote sensing, GPS, photogrammetry etc.*	3	2	1	2	2	2	-	-	-	-	-	2	3	-
	Average	**3**	**2**	**1**	**2**	**1**	2	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**-**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/CIVIL**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

20CE316	CONSTRUCTION MATERIALS	L	T	P	C
		2	0	0	2

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Use suitable construction materials for building construction.*	*Apply*
CO2:	*Suggest the suitability of lime, cement, aggregates and mortar for building construction.*	*Apply*
CO3:	*Analyse the properties of concrete for building construction.*	*Analyse*
CO4:	*Identify suitable timber products and other materials for appropriate construction.*	*Apply*
CO5:	*Select and justify appropriate advanced and modern building materials for various construction applications*	*Evaluate*

UNIT - I STONES – BRICKS – CONCRETE BLOCKS [9]

Stone as Building Material – Criteria for Selection – Tests on Stones – Deterioration and Preservation of Stone Work – Bricks – Classification – Manufacturing of Clay and Fly Ash Bricks – Tests on Bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for Special Use – Refractory Bricks – Cement, Concrete Blocks – Lightweight Concrete Blocks.

UNIT - II LIME – CEMENT – AGGREGATES – MORTAR [9]

Lime: Characteristics, Classification, Manufacturing Process – Cement: Ingredients, Types and Grades, Properties, Manufacturing process, Testing of Cement– Industrial By-products: Fly ash – Aggregates: Natural Stone Aggregates, Classification Characteristics of Aggregates, Testing of Aggregates - Cement Mortar: Functions, Uses of Mortar, Types of Mortar, Ingredients of Mortar, Tests

UNIT - III CONCRETE [9]

Introduction – Characteristics of Good Concrete – Advantages and Disadvantages of Concrete – Application – Classification – Plain Cement Concrete – Ingredients – Bulking of Sand - Water Cement Ratio – Grading of Aggregates – Methods of Proportioning – Mixes Used in Concrete Works – Workability - Preparation of Plain Cement Concrete – Properties – Water Proof Concrete – Concepts of Precast, Reinforced &Prestressed Concrete

UNIT - IV TIMBER AND OTHER MATERIALS [9]

Timber – Market Forms – Industrial Timber– Plywood – Veneer – Thermacole – Panels of Laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers.

UNIT - V MODERN MATERIALS [9]

Glass – Ceramics – Sealants for Joints – Fibre Glass Reinforced Plastic – Clay Products – Refractories – Composite Materials – Types – Applications of Laminar Composites – Fibre Textiles – Geomembranes and Geotextiles for Earth Reinforcement.

Total (L: 45 T: 0) = 45 Periods

Text Books :

1 Varghese, P.C., Building Materials, Prentice Hall India Learning Private Limited, Delhi, Second Edition, 2015.
2 Rajput. R.K., Engineering Materials, S Chand & Company, Coimbatore, Third Edition, 2006.

Reference Books :

1 Jagadish.K.S., Venktarama Reddy., B.V. and Nanjunda Rao, K.S., Alternative Building Materials Technology, New Age International Private Limited, Bengaluru, Second Edition, 2017.
2 Gambhir, M.L. and Neha Jamwal., Building Materials, Products, Properties and Systems, McGraw Hill Education, Bengaluru, First Edition, 2017.
3 Bhavikatti, S.S., Building Materials, Vikas Publishing House, Noida, First Edition, 2012.
4 http://nptel.ac.in/courses/105102088/.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Use suitable construction materials for building construction.*	3	2	-	1	-	1	-	-	-	-	-	2	2	2
CO2	*Suggest the suitability of lime, cement, aggregates and mortar for building construction.*	3	-	-	-	-	-	-	-	-	-	-	2	2	2
CO3	*Analyse the properties of concrete for building construction.*	3	2	2	-	-	1	-	-	-	-	-	2	2	2
CO4	*Identify suitable timber products and other materials for appropriate construction.*	3	-	-	-	-	1	-	-	-	-	-	2	2	2
CO5	*Select and justify appropriate advanced and modern building materials for various construction applications*	2	-	-	1	-	1	-	-	-	-	-	1	2	2
	Average	**3**	**2**	2	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/CIVIL**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

20CE321	**COMPUTER AIDED BUILDING DRAWING**	L	T	P	C
		0	0	3	1

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Apply the principles of planning and bye-laws used in building planning.*	*Apply*
CO2:	*Prepare comprehensive planning and draw layout, plan, elevation & sectional elevation of different types of building.*	*Understand Apply*
CO3:	*Draw plan, elevation and section of RCC framed structures.*	*Create*
CO4:	*Draw plan, elevation and section of factory buildings.*	*Create*
CO5:	*Develop 2D and 3D model of building*	*Create*

List of Experiments:

1. Classification of buildings - Principles of Planning - Dimensions of Buildings - Building Bye-Laws for Floor Area Ratio, Open Spaces - Orientation of Buildings - Lighting and Ventilation
2. Planning and Preparing Sketches and Detailed Drawings of Residential Buildings (Flat and Sloping Roof), Schools, Hostels, Hospitals Including Details of Doors and Windows
3. Detailed Drawings of RCC Framed Structures
4. Detailed Drawings of Single Storey Factory Buildings with Trusses.
5. Perspective View of One and Two Storey Buildings

Total : 45 Periods

CO PO MAPPING

CO	**Course Outcomes**	**Programme Outcomes**													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Apply the principles of planning and bye-laws used in building planning.*	*3*	-	3	2	3	-	-	-	2	3	-	3	2	2
CO2	*Prepare comprehensive planning and draw layout, plan, elevation & sectional elevation of different types of building.*	*3*	-	2	3	3	-	-	-	2	3	-	3	2	1
CO3	*Draw plan, elevation and section of RCC framed structures.*	*3*	-	2	2	3	3	-	-	2	2	-	3	-	1
CO4	*Draw plan, elevation and section of factory buildings.*	*3*	-	3	3	2	3	3	-	3	3	-	3	2	1
CO5	*Develop 2D and 3D model of building*	-	-	3	-	3	-	-	-	-	-	2	3	-	1
	Average	***3***	**-**	**3**	**2**	**3**	**3**	**3**	**-**	**2**	**3**	**2**	**3**	**2**	**1**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/CIVIL**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

20CE322	**SURVEY PRACTICAL**	L	T	P	C
		0	0	3	1

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Handle survey instruments like theodolite, tacheometery and total station in field.*	*Understand*
CO2:	*Determine the elevation of points using levelling instrument.*	*Evaluate*
CO3:	*Calculate the height and distance of various objects.*	*Evaluate*
CO4:	*Carryout triangulation surveying including general field marking for various engineering projects and curves setting.*	*Analyse*
CO5:	*Use total station for various engineering project*	*Understand*

List of Experiments:

CHAIN SURVEYING & COMPASS SURVEYING & PLANE TABLE SURVEYING

1. Study of Chain, Compass, Plane Table Surveying and its Accessories

LEVELLING AND ITS APPLICATIONS

2. Study of Levels and Leveling Staff
3. Fly Leveling and Check Leveling using Dumpy Level

THEODOLITE SURVEYING AND ITS APPLICATIONS

4. Study of Theodolite and its Accessories
5. Measurement of Horizontal and Vertical Angle
6. Theodolite Traversing
7. Tachometric Constants
8. Heights and Distances using Stadia Tachometric Principles
9. Heights and Distances using Tangential Tachometric Principles
10. Heights and Distances using Triangulation – Single and Double plane Method
11. Setting out Simple Curve & Transition Curve
12. Field Work using Total Station

Total : 45 Periods

CO PO MAPPING

CO	**Course Outcomes**	**Programme Outcomes**													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Handle survey instruments like theodolite, tacheometery and total station in field.*	3	3	-	-	3	-	-	-	2	1	-	1	2	2
CO2	*Determine the elevation of points using levelling instrument.*	3	3	-	-	-	1	-	-	2	1	-	1	-	2
CO3	*Calculate the height and distance of various objects.*	3	3	-	-	-	1	-	-	2	1	-	1	-	2
CO4	*Carryout triangulation surveying including general field marking for various engineering projects and curves setting.*	3	3	-	-	-	1	-	-	2	1	-	1	-	2
CO5	*Use total station for various engineering project*	3	3	-	-	3	1	-	-	2	1	-	2	2	2
	Average	**3**	**3**	**-**	-	3	**1**	-	**-**	**2**	**1**	**-**	**2**	**2**	**2**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/CIVIL**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

20CE323	**STRENGTH OF MATERIALS LABORATORY**	L	T	P	C
		0	0	3	1

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Elaborate the behaviour of materials upon normal external loads.*	*Understand*
CO2:	*Apply the linear laws of elasticity as related to stress and strain.*	*Apply*
CO3:	*Measure the deflection of different sections.*	*Evaluate*
CO4:	*Predict the behaviour of the material under impact conditions.*	*Analyse*
CO5:	*Estimate the physical and mechanical behaviour and properties of construction materials.*	*Evaluate*

List of Experiments:

1. Axial Compression Test to Obtain the Stress – Strain Curve
2. Axial Tension Test to Obtain the Stress – Strain Curve and the Strength
3. Torsion Test to Obtain the Torque vs. Angle of Twist and the Stiffness
4. Flexural test to obtain the Load Deflection Curve and the Stiffness
5. Compression and tension spring test to obtain the Load Deflection Curve and the Stiffness
6. Rockwell and Brinell hardness tests to obtain the hardness number
7. Shear test obtain the maximum shear strength
8. Charpy and Izod impact test to obtain the impact resistance
9. Tests on Brick
   i) Compressive strength
   ii) Efflorescence
   iii) Water absorption
10. Tests on Cement
    i) Standard consistency
    ii) Setting time
    iii) Soundness
    iv) Compressive strength

Total : 45 Periods

CO PO MAPPING

CO	**Course Outcomes**	**Programme Outcomes**													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Elaborate the behaviour of materials upon normal external loads.*	3	2	-	3	-	2	-	-	2	-	-	2	3	3
CO2	*Apply the linear laws of elasticity as related to stress and strain.*	3	2	-	3	-	2	-	-	2	-	-	2	3	3
CO3	*Measure the deflection of different sections.*	3	2	-	3	-	2	-	-	2	-	-	2	3	3
CO4	*Predict the behaviour of the material under impact conditions.*	3	2	-	3	-	2	-	-	2	-	-	2	3	3
CO5	*Estimate the physical and mechanical behaviour and properties of construction materials.*	3	2	-	3	-	2	-	-	2	-	-	2	3	3
	Average	**3**	**2**	**-**	**3**	**-**	**2**	**-**	**-**	**2**	**-**	**-**	**2**	**3**	**3**

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

Course Faculty ` **Module Coordinator** **Chairman BoS/CIVIL**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - III

		L	T	P	C
20HR351	**CAREER DEVELOPMENT SKILLS - I**	0	2	0	0

Prerequisite: *-*

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Have competent knowledge on grammar with an understanding of its basic rules.*	*Understand*
CO2:	*Communicate effectively and enhance interpersonal skills with renewed self – confidence*	*Apply*
CO3:	*Construct sentence in English and make correction*	*Apply*
CO4:	*Perform oral communication in any formal situation*	*Create*
CO5:	*Develop their LSRW skills.*	*Understand*

UNIT - I **EFFECTIVE ENGLISH – SPOKEN ENGLISH** **[06]**

Basic Rules of Grammar – Parts of Speech – Tenses – Verbs – Sentences construction - Vocabulary – idioms & phrases – Synonyms – Antonyms – Dialogues and conversation – Exercise(Speaking).

UNIT - II **ESSENTIAL COMMUNICATION** **[06]**

Verbal communication – Effective communication – Active Listening – Paraphrasing – Feedback, Non Verbal Communication – Body language of self and Others, Important of feelings in communication – Dealing with feelings in communication practice – Exercise.

UNIT - III **WRITTEN COMMUNICATION – PART 1** **[06]**

Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition – Change of Voice – Change of Speech – One word Substitution – Using the same word as different parts of speech – Odd Man Out – Spelling & Punctuation (Editing).

UNIT - IV **WRITTEN COMMUNICATION – PART – 2** **[06]**

Analogies – Sentences Formation – Sentence Completion – Sentence Correction – idioms & Phrases – Jumbled Sentences, Letter Drafting (Formal Letters) – Reading Comprehension (Level 1) – Contextual Usage – Foreign Languages Words used in English – Exercise.

UNIT - V **ORAL COMMUNICATION – PART – 1** **[06]**

Self-introduction – Situational Dialogues / Role Play (Telephonic Skills) – Oral Presentations – Prepared –'Just A Minute' Sessions (JAM) – Presentation Skills – Exercise.

Total (L= 0, T = 30) = 30 Periods

Text Books :

1 Anne Laws, Writing Skills, Orient Black Swan., Hyderabad, 2011.

2 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2015

Reference Books :

1 Raj N Bakshmi, English Grammar Practice, Orient Black Swan, Hyderabad, First Edition, 2009.

2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.

3 Thakur K B Sinha, Enrich Your English, Vijay Nicole, Chennai, First Edition, 2005.

4 Norman Lewis. W.R., "Word Power Made Easy", Goyal Publications.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Have competent knowledge on grammar with an understanding of its basic rules.*	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO2	*Communicate effectively and enhance interpersonal skills with renewed self – confidence*	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO3	*Construct sentence in English and make correction*	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO4	*Perform oral communication in any formal situation*	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO5	*Develop their LSRW skills.*	-	-	-	-	1	-	-	-	3	3	-	3	-	-
	Average	-	-	-	-	1	-	-	-	**3**	**3**	**-**	**3**	**-**	**-**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS S&H**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

		L	T	P	C
20MA432	**NUMERICAL METHODS (B.E CIVIL ENGINEERING)**	3	1	0	4

***Prerequisite*: -**

Course Outcomes : On successful completion of the course , the student will be able to		**Cognitive Level**
CO1:	*Solve the polynomial, transcendental equations and simultaneous linear equations numerically.*	*Apply*
CO2:	*Interpreting, the Interpolation techniques.*	*Understand*
CO3:	*Developing their skills in numerical differentiation and integration.*	*Remember*
CO4:	*Solve ordinary differential equations numerically.*	*Apply*
CO5:	*Able to apply the concepts of numerical solutions to boundary value problems.*	*Apply*

UNIT - I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS [12]

Solutions to polynomials and transcendental equations - Newton's method, Regula-falsi method - Solutions to simultaneous linear equations - Gauss Elimination method - Gauss-Seidel method - Eigen value of a matrix by Power method.

UNIT - II INTERPOLATION AND APPROXIMATION [12]

Newton's forward and backward difference interpolation techniques (equal intervals) - Lagrange's interpolation - Inverse Lagrange's interpolation and Divided difference method (for unequal intervals).

UNIT - III NUMERICAL DIFFERENTIATION AND INTEGRATION [12]

Numerical differentiation using Newton's forward and backward interpolation methods - Numerical integration by trapezoidal and Simpson's 1/3rd and 3/8th rules - Double integrals using trapezoidal rule and Simpson's rule.

UNIT - IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS [12]

Solving first order Ordinary Differential Equations by Taylor series **-** Euler's and Modified Euler's Method - Fourth order Runge-Kutta Method - Milne's predictor and corrector method.

UNIT - V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS [12]

Solution of one dimensional heat equation by Bender - Schmidt and Crank - Nicolson method - Solution of One dimensional wave equation - Solution of two dimensional Poisson equations.

Total (L: 45 T:15) = 60 Periods

Text Books :

1 Dr. B. S. Grewal, Numerical Methods in Engineering and Science, Khanna Publishers, New Delhi, Twelfth Edition, 2015.

2 Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing Company, New Delhi, Fourth Edition, 2014.

Reference Books:

1 Sukhendu Dey and Shishir Gupta, Numerical Methods, Tata Mc Graw Hill Publishing Company, New Delhi, Fifth Edition, 2016.

2 V. Gerald, Applied Numerical Analysis, Pearson Education, New Delhi, Sixth edition 2015.

3 P.Kandasamy, K.Thilagavathy and K.Gunavathy, Numerical Methods, S.Chand & Company Ltd, New Delhi Fifth Edition, 2016.

4 https://www.youtube.com/watch?v=AT7Olelic8U&https://www.youtube.com/watch?v=QTQ8bO1F-Dg

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Solve the polynomial, transcendental equations and simultaneous linear equations numerically.*	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO2	*Interpreting, the Interpolation techniques.*	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO3	*Developing their skills in numerical differentiation and integration.*	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	*Solve ordinary differential equations numerically.*	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO5	*Able to apply the concepts of numerical solutions to boundary value problems.*	3	3	3	3	-	-	-	-	-	-	-	-	-	-
	Average	**3**	**3**	**3**	**3**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

Course Faculty ` ***Module Coordinator*** **Chairman BoS/MATHS**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

		L	T	P	C
20CE412	**SOIL MECHANICS**	3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Characterize and classify soils.*	*Understand*
CO2:	*Solve the problems related to effective stress, permeability and seepage.*	*Analyse*
CO3:	*Compute and analyze the consolidation settlements*	*Analyse*
CO4:	*Estimates shear strength parameters for field conditions.*	*Evaluate*
CO5:	*Explain the concept of slope stability and slope failures of cohesive soil.*	*Remember*

UNIT - I SOIL CLASSIFICATION AND COMPACTION [9]

Nature of Soil - Problems with Soil - Phase Relation - Sieve Analysis - Sedimentation Analysis – Atterberg Limits- Classification for Engineering Purposes - BIS Classification System – Soil Compaction - Factors Affecting Compaction – Laboratory Compaction Methods.

UNIT - II SOIL WATER AND PERMEABILITY [9]

Soil Water – Various Forms – Influence of Clay Minerals – Capillary Rise – Suction - Effective Stress Concepts in Soil – Total, Neutral and Effective Stress Distribution in Soil - Permeability – Darcy's Law- Permeability Measurement in the Laboratory – Quick Sand Condition - Seepage –Introduction to Flow Nets –Properties and Uses - Application to Simple Problems.

UNIT - III STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT [9]

Stress Distribution - Soil Media – Boussinesq Theory - Use of Newmark's Influence Chart –Components of Settlement — Immediate and Consolidation Settlement – Terzaghi's One Dimensional Consolidation Theory – Computation of Rate of Settlement. - √t and log t Methods– e-log p Relationship - Factors Influencing Compression Behaviour of soils.

UNIT - IV SHEAR STRENGTH [9]

Shear strength of Cohesive and Cohesionless Soils - Mohr - Coulomb Failure Theory – Saturated Soil - Strength Parameters - Measurement of Shear Strength, Direct Shear, Triaxial Compression, UCC and Vane Shear Tests –Types of Shear Tests Based on Drainage and their Applicability - Drained and Undrained Behaviour of Clay and Sand.

UNIT - V SLOPE STABILITY [9]

Slope Failure Mechanisms - Modes - Infinite Slopes - Finite Slopes – Total and Effective Stress Analysis - Stability Analysis for Purely Cohesive and C-ø Soil - Method of Slices – Modified Bishop's Method - Friction Circle Method - Stability Number – Problems – Slope Protection Measures.

Total (L: 45 T: 0) = 45 Periods

Text Books :

1. Punmia,B.C. Ashok Kumar Jain and Arun Kumar Jain., Soil Mechanics and Foundations, Laxmi Publications, New Delhi, Sixteenth Edition, 2017.
2. Gopal Ranjan. and Rao A.S.R., Basic and Applied Soil Mechanics, New Age International, New Delhi, Third Edition, 2016.

Reference Books :

1. Arora, K.R., Soil Mechanics and Foundation Engineering, Standard Publishers Distributors, New Delhi, Seventh Edition, 2019.
2. Muni Budhu., Soil Mechanics and Foundations, Wiley, Noida, Wiley India Edition, 2016.
3. Donald. P.Coduto, Man chu Ronald Yeung and William A Kitch., Geotechnical Engineering Principles and Practices, Pearson, London, Second Edition, 2017.
4. http://nptel.ac.in/courses/105103097/.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Characterize and classify soils.*	3		2	-	-	2	-	-	-	-	-	3	2	2
CO2	*Solve the problems related to effective stress, permeability and seepage.*	3	2	3	-	-	-	-	-	-	-	-	2	3	3
CO3	*Compute and analyze the consolidation settlements*	3	2	2	2	-	-	-	2	2	-	-	3	2	2
CO4	*Estimates shear strength parameters for field conditions.*	3	2	3	2	2	-	-	2	-	-	-	3	3	2
CO5	*Explain the concept of slope stability and slope failures of cohesive soil.*	3	-	3	2	2	2	-	2	-	-	-	3	2	2
Average		**3**	2	3	2	2	2	-	2	2	-	-	3	3	3

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

Course Faculty ` *Module Coordinator* Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

20CE413	**STRENGTH OF MATERIALS**	L	T	P	C
		3	1	0	4

Prerequisite: *Mechanics of Solids*

Course Outcomes: On Completion of this course, the student will be able to **Cognitive Level**

CO1:	*Apply energy principles and compute deflections of beam under the principle of virtual work method.*	*Apply*
CO2:	*Analyse propped cantilever, fixed beam and continuous beam and draw SFD & BMD.*	*Analyse*
CO3:	*Find the stresses developed due to eccentricity in short column and evaluate the buckling strength of long column*	*Evaluate*
CO4:	*Determine different stresses developed in thick and thin cylinders and apply the concept of theory of failures.*	*Analyse*
CO5:	*Determine the stresses due to unsymmetrical bending of beams analyse shear flow and curved beams.*	*Analyse*

UNIT - I ENERGY PRINCIPLES [12]

Strain Energy and Strain Energy Density – Strain Energy in Traction, Shear in Flexure and Torsion –Castigliano's Theorems – Principle of Virtual Work Application of Energy Theorems for Computing Deflections in Beams and Trusses – Maxwell's Reciprocal Theorems.

UNIT - II INDETERMINATE BEAMS [12]

Propped Cantilever and Fixed Beams-Fixed End Moments and Reactions Due to Lateral Loads Theorem of Three Moments – Analysis of Continuous Beams (limited to two unknowns.)

UNIT - III COLUMNS [12]

Eccentrically Loaded Short Columns – Middle Third Rule – Core Section – Columns of Unsymmetrical Sections – Euler's Theory of Long Columns – Critical Loads for Prismatic Columns with Different End Conditions; Rankine-Gordon Formula for Eccentrically Loaded Columns .

UNIT - IV THIN AND THICK CYLINDERS, THEORIES OF FAILURES [12]

Thin Cylinders and Shells under Internal Pressure –Deformation of Thin Cylinders and Shells. Thick Cylinders – Compound Cylinders. - Theories of Failure – Principal Stress, Dilatation, Principal Strain, Shear Stress, Strain Energy, Distortion Energy and Mohr's Theories – Application in Analysis of Stress (limited to Two Dimensional).

UNIT - V ADVANCED TOPICS IN BENDING OF BEAMS [12]

Unsymmetrical Bending of Beams of Symmetrical and Unsymmetrical Sections – Shear Flow -Shear Centre - Curved Beams – Winkler Bach Formula – Stress Concentration.

Total (L: 45 T:15) = 60 Periods

Text Books :

1 Rajput, R.K., A Textbook of Strength of Materials**,** Laxmi Publications, New Delhi**,** Sixth Edition, 2018.

2 Punmia, B.C. Ashok Kumar Jain. and Arun Kumar Jain., Mechanics of Material, Laxmi Publications, New Delhi**,** Tenth Edition, 2017.

Reference Books :

1 Nash, William.A., Theory and Problems of Strength of Materials, Schaum's Outline Series, Tata McGraw-Hill Publishing Co., New Delhi, First Edition, 2007.

2 Srinath, L.S., Advanced Mechanics of Solids, McGraw Hill Education, New York, Third Edition, 2017.

3 Popov, Egor. P., Engineering Mechanics of Solids, Pearson Education, New Delhi, Second Edition, 2015.

4 https://nptel.ac.in/courses/105/105/105105108/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Apply energy principles and compute deflections of beam under the principle of virtual work method.*	2	3	2	3	2	-	-	-	-	2	-	3	2	2
CO2	*Analyse propped cantilever, fixed beam and continuous beam and draw SFD & BMD.*	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO3	*Find the stresses developed due to eccentricity in short column and evaluate the buckling strength of long column*	3	2	3	3	3	3	-	1	-	2	-	3	3	3
CO4	*Determine different stresses developed in thick and thin cylinders and apply the concept of theory of failures.*	3	3	3	3	2	3	-	1	-	2	-	3	3	3
CO5	*Determine the stresses due to unsymmetrical bending of beams analyze shear flow and curved beams.*	2	3	3	3	3	3	-	1	-	2	-	3	2	3
	Average	3	3	3	3	3	3	-	1	-	2	-	3	3	3

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

Course Faculty ` *Module Coordinator* Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

20CE414	**APPLIED HYDRAULIC AND HYDRAULIC MACHINERY**	L	T	P	C
		3	0	0	3

Prerequisite: *Fluid Mechanics*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Explain fluid action in open channel flow.*	*Understand*
CO2:	*Identify an effective section for flow in different cross sections and solves problems in uniform, gradually and rapidly varied flows in steady state conditions.*	*Remember*
CO3:	*Derive the concept, working applications of impact of jets with the importance of constructing velocity triangles.*	*Apply*
CO4:	*Perform characteristic study on pumps and select pumps for practical purposes.*	*Analyse*
CO5:	*Explore the design concept of turbines, perform characteristic study and select hydraulic turbines for hydropower plants.*	*Evaluate*

UNIT – I OPEN CHANNEL FLOW **[9]**

Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation – channel transition.

UNIT – II UNIFORM FLOW &NON UNIFORM FLOW **[9]**

Uniform flow – Manning's and Chezy's formula – Determination of roughness coefficients – Most economical sections – Non-erodible channels. Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Hydraulic jump – Types – Energy dissipation –Surges.

UNIT – III IMPACT OF JETS **[9]**

Force exerted by the jet on a stationary vertical plate(Inclined flat plate, curved plate) - Force exerted by the jet on a moving plate - Force exerted by the jet of water on unsymmetrical moving curve plate at its tip – series of vanes, radial curved vanes

UNIT – IV PUMPS **[9]**

Centrifugal Pump - Minimum Speed to Start the Pump – Multistage Pumps – Jet and Submersible Pumps - Positive Displacement Pumps - Reciprocating Pump - Negative Slip - Flow Separation Conditions - Air Vessels -Indicator Diagram and its Variation

UNIT – V TURBINES **[9]**

Turbines - Application of Momentum Principle – Turbines - Classification - Draft Tube and Cavitation - Radial Flow Turbines - Axial Flow Turbines – Impulse and Reaction

Total (L: 45 T: 0) =45Periods

Text Books :

1 Subramanya, K., Flow in Open channels, McGraw Hill Education, Noida, Fourth Edition, 2015.

2 Bansal, R.K.,A Textbook of Fluid Mechanics and Hydraulics Machines, Laxmi Publications Pvt. Ltd, New Delhi ,Tenth Edition, 2018.

Reference Books :

1 Rajput, R.K., Fluid Mechanics and Hydraulic Machines, S Chand & Company, New Delhi, Sixth Edition, 2016.

2 Modi, P.N and Seth, S.M., Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, Twenty Two Edition, 2018.

3 Rattan S. S., Fluid Mechanics and Hydraulic Machines, Khanna Book Publishing, New Delhi, First Edition, 2019.

4 http://nptel.ac.in/courses/105107059/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Explain fluid action in open channel flow.*	3	3	3	3	2	-	-	-	-	-	-	2	-	3
CO2	*Identify an effective section for flow in different cross sections and solves problems in uniform, gradually and rapidly varied flows in steady state conditions.*	3	3	3	3	2	-	-	-	-	-	-	2	-	3
CO3	*Derive the concept, working applications of impact of jets with the importance of constructing velocity triangles.*	3	3	3	3	2	-	-	-	-	-	-	2	-	2
CO4	*Perform characteristic study on pumps and select pumps for practical purposes.*	3	3	3	3	2	-	-	-	-	-	-	2	-	2
CO5	*Explore the design concept of turbines, perform characteristic study and select hydraulic turbines for hydropower plants.*	3	3	3	3	2	-	-	-	-	-	-	2	-	3
	Average	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**3**

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

20CE415	**CONSTRUCTION TECHNIQUES AND PRACTICES**	L	T	P	C
		3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Plan different stages of construction techniques and identify suitable supporting structures based on the condition.*	*Remember*
CO2:	*Adopt different techniques of building construction as per requirement.*	*Apply*
CO3:	*Apply appropriate techniques used for sub structure construction.*	*Apply*
CO4:	*Identify and apply different techniques for super structure construction.*	*Analyse*
CO5:	*Use suitable equipment needed for construction of various types of structures from foundation to super structure.*	*Understand* *Apply*

UNIT - I PLANNING FOR CONSTRUCTION & SUPPORTING STRUCTURES [9]

Various Stages in the Construction of the Project – Construction Coordination - Job Planning - Technical Planning – Scheduling - Site Clearance - Marking – Setting out foundations , Earthwork job Layout – Temporary Sheds – Setting Out Works – Centering& Shuttering - Slip Forms - Scaffolding – Shoring – De-shuttering Forms.

UNIT - II CONSTRUCTION PRACTICES [9]

Masonry – Stone Masonry – Bond in Masonry - Concrete Hollow Block Masonry – Flooring – Damp Proof Courses – Construction Joints – Movement and Expansion Joints– Pre Cast Pavements – Building Foundations – Basements – Fabrication and Erection of Steel Trusses – Frames – Braced Domes – Laying Brick - Arrangement of bonds in brick masonry— Weather and Water Proof – Roof Finishes –Acoustic and Fire Protection.

UNIT - III SUB STRUCTURE CONSTRUCTION [9]

Techniques of Box Jacking – Pipe Jacking -Under Water Construction of Diaphragm Walls And Basement – Tunneling Techniques – Piling Techniques - Well and Caisson - Sinking Cofferdam – Cable Anchoring and Grouting-Driving Diaphragm Walls, Sheet Piles - Shoring for Deep Cutting – Well Points -Dewatering And Stand by Plant Equipment for Underground Open Excavation.

UNIT - IV SUPER STRUCTURE CONSTRUCTION [9]

Launching Girders, Bridge Decks, Off Shore Platforms – Special Forms for Shells - Techniques for Heavy Decks – In-Situ Pre-Stressing In High Rise Structures, Material Handling - Erecting Light Weight Components On Tall Structures - Support Structure for Heavy Equipment And Conveyors –Erection of Articulated Structures, Braced Domes and Space Decks.

UNIT - V CONSTRUCTION EQUIPMENT [9]

Selection of Equipment for Earth Work - Earth Moving Operations - Types of Earthwork Equipment -Tractors, Motor Graders, Scrapers, Front End Waders, Earth Movers – Equipment for Foundation and Pile Driving. Equipment for Compaction, Batching And Mixing and Concreting - Equipment for Material Handling and Erection of Structures - Equipment for Dredging, Trenching, Tunneling.

Total (L: 45 T: 0) = 45 Periods

Text Books :

1. Peurifoy, R.L. Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill Education, Noida, Seventh Edition, 2010.
2. Purushothama Raj, P., Construction Techniques, Equipments and Practices, Sri Krishna Hitech Publishing Company Pvt. Ltd, Chennai, Fifth Edition, 2015.

Reference Books :

1. Sharma, S.C., Construction Equipment and Management, Khanna Publishers, New Delhi, First Edition, 2016.
2. Arora, S.P. and Bindra, S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, New Delhi, Reprint, 2010.
3. Deodhar, S.V., Construction Equipment and Job Planning, Khanna Publishers, New Delhi, Fourth Edition, 2012.
4. https://nptel.ac.in/courses/114106035/15.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Plan different stages of construction techniques and identify suitable supporting structures based on the condition.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO2	*Adopt different techniques of building construction as per requirement.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO3	*Apply appropriate techniques used for sub structure construction.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO4	*Identify and apply different techniques for super structure construction.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO5	*Use suitable equipment needed for construction of various types of structures from foundation to super structure.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
	Average	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**-**	**2**	**2**	**2**	**3**	**2**	**3**

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

20CE416	**HIGHWAY ENGINEERING**	L	T	P	C
		3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Acquire skills in selecting the best highway alignment and develop the highway proposal.*	*Understand*
CO2:	*Design a variety of highway cross sectional elements.*	*Create*
CO3:	*Raise knowledge on highway materials and construction practice.*	*Remember*
CO4:	*Design flexible and rigid pavements as per IRC codes.*	*Create*
CO5:	*Deduct the distress in flexible and rigid pavements and identify appropriate strengthening methods.*	*Analyse*

UNIT - I HIGHWAY PLANNING AND ALIGNMENT [9]

History of Road Construction, Highway Development in India – Jayakar Committee Recommendations and Realizations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Institutions for Highway Development at National Level - Indian Road Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (Morth) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment, Engineering Surveys for Alignment - Classification and Cross Section of Urban and Rural Roads (IRC) - Principles of Highway Financing.

UNIT - II GEOMETRIC DESIGN OF HIGHWAYS [9]

Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards], Design of Horizontal Alignment – Horizontal Curves Super Elevation, Widening of Pavements on Horizontal Curves and Transition Curves, Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves-Sight Distances – Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] -Geometric Design of Hill Roads [IRC Standards Only].

UNIT - III HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE [9]

Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test - Aggregate - Crushing, Abrasion, Impact Tests, Water Absorption, Flakiness and Elongation Index and Stone Polishing Value Test - Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests. - Construction Practice - Water Bound Macadam Road, Bituminous Road And Cement Concrete Road [As Per IRC and Morth Specifications] - Highway Drainage [IRC Recommendations].

UNIT - IV FLEXIBLE AND RIGID PAVEMENTS [9]

Rigid And Flexible Pavements- Components and their Functions -Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design Of Pavements - ESWL, Climate, Sub-Grade Soil And Traffic - Design Practice for Flexible Pavements [IRC Method And Recommendations- Problems] - Design Practice for Rigid Pavements – IRC Recommendations - Concepts Only.

UNIT - V HIGHWAY MAINTENANCE [9]

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. - Types of Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – Special Repairs - Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of Pavement Failure and Strengthening - Overlay Design by Benkelman Beam Method [Procedure Only].

Total (L: 45 T: 0) = 45 Periods

Text Books :

1 Khanna, S. K.and Justo, C.E.G., Highway Engineering, Nemch and Publishers, Roorkee, Tenth Edition, 2018.
2 Subramanian, K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications, Pvt. Ltd, Chennai, Second Edition, 2018.

Reference Books :

1 Kadiyali, L. R., Transportation Engineering, Khanna Book Publishing, New Delhi, First Edition, 2016.
2 Mallick,Rajib B. and Tahar El-Korchi., Pavement Engineering: Principles and Practice, CRC Press, Florida, Third Edition, 2017.
3 Rangwala, S.C., Highway Engineering, Charotar Publishing House Pvt. Ltd., Anand, Eleventh Edition, 2017.
4 http://nptel.ac.in/courses/105101087/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Acquire skills in selecting the best highway alignment and develop the highway proposal.*	3	3	3	3	2	3	3	2	3	2	2	3	2	3
CO2	*Design a variety of highway cross sectional elements.*	3	3	3	3	2	3	3	2	3	2	2	3	2	3
CO3	*Raise knowledge on highway materials and construction practice.*	3	3	3	3	2	3	3	2	3	2	2	3	2	3
CO4	*Design flexible and rigid pavements as per IRC codes.*	3	3	3	3	2	3	3	2	3	2	2	3	2	3
CO5	*Deduct the distress in flexible and rigid pavements and identify appropriate strengthening methods.*	3	3	3	3	2	3	3	2	3	2	2	3	2	3
	Average	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**3**

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

		L	T	P	C
20CE421	**FLUID MECHANICS AND MACHINERY LABORATORY**	0	0	3	1

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to	**Cognitive Level**
CO1: Measure discharge using various measuring devices.	*Remember*
CO2: Estimate the friction and measure the frictional losses in fluid flow.	*Analyse*
CO3: Determine the force exerted by jet of water on vanes.	*Understand*
CO4: Estimate performance parameters of a given centrifugal and reciprocating pump.	*Analyse*
CO5: Categorize and plot the performance characteristics of turbines.	*Analyse*

1. Determination of Co-efficient of Discharge for Orifice
2. Determination of Co-efficient of Discharge for Notches
3. Determination of Co-efficient of discharge for Venturimeter
4. Determination of Co-Efficient of Discharge for Orifice Meter
5. Study of Impact of Jet on Flat Plate (Normal / Inclined)
6. Study of Friction Losses in Pipes
7. Study of Minor Losses in Pipes
8. Study on Performance Characteristics of Centrifugal Pumps (Constant Speed / Variable Speed)
9. Study on Performance Characteristics of Reciprocating Pump
10. Study on Performance Characteristics of Pelton Turbine
11. Study on Performance Characteristics of Francis Turbine
12. Study on Performance Characteristics of Kaplan Turbine

Total : 45 Periods

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Measure discharge using various measuring devices.*	3	3	3	2	2	-	-	-	-	-	-	2	-	3
CO2	*Estimate the friction and measure the frictional losses in fluid flow.*	3	3	3	2	2	-	-	-	-	-	-	2	-	3
CO3	*Determine the force exerted by jet of water on vanes.*	3	3	3	3	2	-	-	-	-	-	-	2	-	3
CO4	*Estimate performance parameters of a given centrifugal and reciprocating pump.*	3	3	3	3	2	-	-	-	-	-	-	2	-	3
CO5	*Categorize and plot the performance characteristics of turbines.*	3	3	3	3	2	-	-	-	-	-	-	2	-	3
	Average	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**

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

Course Faculty ` **Module Coordinator** **Chairman BoS/Civil**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

		L	T	P	C
20CE422	**SOIL MECHANICS LABORATORY**	0	0	3	1

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to	**Cognitive Level**
CO1: Analyse grain size distribution using sieve analysis and by hydrometer analysis.	*Analyse*
CO2: Identify and classify soils with reference to their characteristics.	*Understand*
CO3: Determine and interpret different soil properties.	*Analyse*
CO4: Evaluate the strength of the soil and to calculate shear strength of the soils.	*Evaluate*
CO5: Estimate the consolidation properties of soil.	*Remember*

List of Experiments:

1. Grain Size Distribution – Sieve Analysis
2. Grain Size distribution – Hydrometer Analysis
3. Specific Gravity of Soil
4. Relative density of Sands
5. Field Density by Core Cutter Method and Sand Replacement Method
6. Atterberg's Limits Test
7. Coefficient of Permeability - Variable Head Method
8. Coefficient of Permeability – Constant Head Method
9. Unconfined Compression Test
10. Direct Shear Test
11. Standard Proctor Compaction Test
12. Tri-axial compression tests in Cohesion less Soil
13. One Dimensional Consolidation Test

Total : 45 Periods

CO PO MAPPING

CO	**Course Outcomes**	**Programme Outcomes**													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Analyse grain size distribution using sieve analysis and by hydrometer analysis.*	3	3	3	2	2	-	-	-	-	-	-	2	2	3
CO2	*Identify and classify soils with reference to their characteristics.*	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	*Determine and interpret different soil properties.*	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO4	*Evaluate the strength of the soil and to calculate shear strength of the soils.*	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO5	*Estimate the consolidation properties of soil.*	3	3	3	2	2	-	-	-	-	-	-	2	2	2
	Average	3	3	3	2	2	-	-	-	-	-	-	2	2	2

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

Course Faculty ` **Module Coordinator** **Chairman BoS/Civil**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

20CE423	**HIGHWAY ENGINEERING LABORATORY**	L	T	P	C
		0	0	3	1

Prerequisite:-

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Select the best highway materials.*	*Apply*
CO2:	*Determine different physical properties of aggregates by performing different test on road aggregates.*	*Evaluate*
CO3:	*Evaluate the strength of sub-grade soil by CBR (California Bearing Ratio) test.*	*Evaluate*
CO4:	*Estimate various properties of bitumen material and mixes by performing various tests on it.*	*Analyse*
CO5:	*Apply the concepts of properties of aggregates and binding materials for design of roads.*	*Apply*

List of Experiments:

1. Sieve Analysis of Fine and Coarse Aggregates
2. Specific Gravity &Water Absorption Test on Fine and Coarse Aggregates
3. Crushing Strength of Aggregates.
4. Impact Test on Aggregates.
5. Los Angles Abrasion Test on Aggregates
6. Flakiness Index, Elongation Index of Coarse Aggregates
7. CBR Test on Soil
8. Penetration Test on Bitumen
9. Softening Point Test
10. Viscosity Test
11. Ductility Test
12. Determination of Binder Content on Bituminous Mixes
13. Determination of Marshall Stability Value on Bituminous Mixes
14. Tests on Bituminous Emulsion

Total : 45 Periods

CO PO MAPPING

CO	**Course Outcomes**	**Programme Outcomes**													
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	*Select the best highway materials.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO2	*Determine different physical properties of aggregates by performing different test on road aggregates.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO3	*Evaluate the strength of sub-grade soil by CBR (California Bearing Ratio) test.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO4	*Estimate various properties of bitumen material and mixes by performing various tests on it.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
CO5	*Apply the concepts of properties of aggregates and binding materials for design of roads.*	3	3	3	3	2	2	2	-	2	2	2	3	2	3
	Average	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**-**	**2**	**2**	**2**	**3**	**2**	**3**

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

Course Faculty ` **Module Coordinator** **Chairman BoS/Civil**

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - IV

		L	T	P	C
20HR422	**CAREER DEVELOPMENT SKILLS - II**	0	2	0	0

Prerequisite: *-*

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Speak and write appropriately by understanding verbal and logical reasoning*	*Apply*
CO2:	*Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions*	*Apply*
CO3:	*Enhance their skills on quantitative aptitude*	*Understand*
CO4:	*Speak and write appropriately by understanding and applying the basic grammatical rules*	*Create*
CO5:	*Critically evaluate problems related to quantitative aptitude*	*Apply*

UNIT - I VERBAL AND LOGICAL REASONING – PART 1 [06]

Alphabet Test – Synonyms & Antonyms – Idioms & Phrases – Analogies - Theme Detection – Odd Words – Statement & Conclusions - Family Tree – Blood Relations – Coding & Decoding – Syllogism – Odd Man Out.

UNIT - II QUANTITATIVE APTITUDE – PART 1 [06]

Numbers: Number system - Squaring of Numbers – Square Roots – Cube Roots – Divisibility – HCF, LCM – Decimals.

UNIT - III QUANTITATIVE APTITUDE – PART 2 [06]

Percentages – Averages – Ratio & Proportion – Mixtures and Allegations – logarithms.

UNIT - IV READING COMPREHENSION&WRITTEN COMMUNICATION –PART 3 [06]

READING SKILLS : Importance of Reading – Definition of Reading – Levels of Reading – Requirements of Reading – Types of Reading – Techniques of Reading - Academic Reading Tips.

UNIT - V QUANTITATIVE APTITUDE – PART 3 [06]

Profit and Loss – Simple Interest & Compound Interest – Problem on Ages – Calendar.

Total (L= 0, T = 30) = 30 Periods

Text Books :

1 Anne Laws, Writing Skills, Orient Black Swan., Hyderabad, 2011.

2 Abhijit Guha, Quantitative Aptitude, TMH, New Delhi, Third Edition,2009

Reference Books :

1 Agarwal. R.S , A.Modern Approach to Verbal and Non- verbal Reasoning, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.

2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.

3 M.B. Lal & Goswami, Objective Instant Arithmetic, Upkar Publications, New Delhi, second edition,2012.

4 Norman Lewis. W.R., "Word Power Made Easy", Goyal Publications

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Speak and write appropriately by understanding verbal and logical reasoning*	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO2	*Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions*	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO3	*Enhance their skills on quantitative aptitude*	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO4	*Speak and write appropriately by understanding and applying the basic grammatical rules*	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO5	*Critically evaluate problems related to quantitative aptitude*	-	-	-	-	-	-	-	-	2	3	-	3	2	2
	Average	-	-	-	-	-	-	-	-	**2**	**3**	**-**	**3**	**2**	**2**

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

Course Faculty ` Module Coordinator Chairman BoS/ENGLISH

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

		L	T	P	C
20HS051	**UNIVERSAL HUMAN VALUES AND UNDERSTANDING HARMONY** (Common To All Branches)	3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Explain the basic concepts of value education.*	*Understanding*
CO2:	*Distinguish between the self and the body, implement the meaning of harmony in the Co–existence of Self and the Body.*	*Understanding*
CO3:	*Explain the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human–human relationships.*	*Understanding*
CO4:	*Describe the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.*	*Understanding*
CO5:	*Explain the ethical and unethical practices in work environment.*	*Understanding*

UNIT - I INTRODUCTION TO VALUE EDUCATION [09]

Need and Basic Guidelines of Value Education – Content and Process of Value Education – Self Exploration – purpose of self-Exploration – Content and Process of Self exploration – Natural Acceptance – Realization and Understanding – Basic Human Aspirations – Continuous Happiness and Prosperity – Exploring Happiness and Prosperity – Basic Requirement for Fulfillment of Human Aspirations – Relationships – Physical Facilities – Right Understanding.

UNIT - II HARMONY IN THE HUMAN BEING [09]

Human Being and Body – Understanding Myself as Co–existence of Self ('I') and Body, Needs of the Self and Body, Activities in the Self and Body, Self ('I') as the Conscious Entity, the Body as the Material Entity – Exercise – Body as an Instrument– Harmony in the Self ('I) – Understanding Myself – Harmony with Body.

UNIT - III HARMONY IN THE FAMILY AND SOCIETY [09]

Harmony in the Family – Justice – Feelings (Values) in Human Relationships – Relationship from Family to Society – Identification of Human Goal – Five dimensions of Human Endeavour.

UNIT - IV HARMONY IN NATURE AND EXISTENCE [09]

Order of Nature – Interconnectedness – Understanding the Four order – Innateness – Natural Characteristic – Basic Activity – Conformance – Introduction to Space – Co–existence of units of Space – Limited and unlimited – Active and No–activity – Existence is Co–existence.

UNIT - V PROFESSIONAL ETHICS [09]

Values in different dimensions of Human Living – Definitiveness of Ethical Human Conduct –Implications of Value based Living – Identification of Comprehensive Human Goal – Humanistic Education – Universal Human Order – Competence and Issues in Professional Ethics.

Total (L= 45, T = 0) = 45 Periods

Text Books :

1 Gaur R.R., Sangal, R., Bagaria, G.P., A Foundation Course in Human Values and Professional Ethics, Excell Books Pvt. Ltd., New Delhi, First Edition, 2016.

2 Tripaty, A.N., Human Values, New Age International Publishers, New Delhi,Third Edition, 2003.

Reference Books :

1 Ivan Illich, Energy & Equity, The Trinity Press, USA, 1974.

2 Schumacher E.F., Small is Beautiful: a study of economics as if people mattered, Britain, 1973.

3 Seebauer, E.G., Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.

4 B P Banerjee, , Foundations of Ethics and Management, Excel Books, First Edition 2005

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Explain the basic concepts of value education.*	1	-	2	-	-	3	2	3	-	3	-	3	-	3
CO2	*Distinguish between the self and the body, implement the meaning of harmony in the Co– existence of Self and the Body.*	1	-	2	-	-	3	2	3	-	3	-	3	-	3
CO3	*Explain the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human–human relationships.*	1	-	2	-	-	3	3	3	-	3	-	3	-	3
CO4	*Describe the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.*	1	-	2	-	2	3	2	3	-	3	-	3	-	3
O5	*Explain the ethical and unethical practices in work environment.*	1	-	2	-	2	3	3	3	-	3	-	3	-	3
	Average	1	-	2	-	2	3	3	3	-	3	-	3	-	3

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

Course Faculty ` Module Coordinator Chairman BoS/MBA

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

		L	T	P	C
20CE511	**RAILWAYS, AIRPORT AND HARBOUR ENGINEERING**	3	0	0	3

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Exemplify various components and their functions of a railway track.*	Understand
CO2:	*Summarize the railway track construction, maintenance and operation.*	Understand
CO3:	*Explain the concepts of airport planning and the components with its functions.*	Understand
CO4:	*Plan, analyze and design the elements for orientation of runways and passenger facility systems.*	Create
CO5:	*Explain various features in harbours and ports, their construction, and coastal protection works and provide basic orientation in harbour structural systems.*	Understand

UNIT - I RAILWAY PLANNING AND DESIGN [9]

Role of Indian Railways in National Development - Permanent Way - Components and Functions - Rails – Types - Rail Fastenings - Concept of Gauges - Coning of Wheels - Creeps and kinks - Sleepers – Functions, Materials, Density, Ballasts – Functions – Materials - Geometric Design of Railway Tracks – Gradients and Grade Compensation – Super Elevation - Widening of Gauges in Curves - Transition Curves - Horizontal and Vertical Curves – Introduction to Metro rail

UNIT - II RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION [9]

. Points and Crossings - Design of Turnouts - Working Principle Signaling - Interlocking and Track Circuiting - Construction & Maintenance – Conventional - Modern methods and Materials - Track Drainage – Track Modernization– Automated maintenance and upgrading – Technologies - Re-laying of Track - Lay outs of Railway Stations and Yards - Rolling Stock - Tractive Power - Track Resistance - Level Crossings

UNIT - III AIRPORT PLANNING AND DESIGN [9]

Role of Air Transport - Components of Airports - Airport Planning – Air traffic potential - Site Selection - Runway – Orientation - Cross wind Component - Wind rose Diagram - Geometric Design and Corrections for Gradients (Problems) - Taxiway Design – Geometric Design Elements - Minimum Separation Distances - Design Speed - Airport Drainage - Airport Zoning –types - obstruction Clearance over Highways and Railways – Circular airport.

UNIT - IV AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL [9]

Airport Layouts – Apron, Terminal Building - Hangars - Motor Vehicle Parking Area and Circulation Pattern – Airport Buildings – Primary functions - Planning Concept - Principles of Passenger Flow - Passenger Facilities Visual Aids – Runway and Taxiway Markings - Wind Direction Indicators - Runway and Taxiway Lightings-Air Traffic Control – Basic Actions - Air Traffic Control Network – Helipads - Service Equipment's.

UNIT - V HARBOUR ENGINEERING [9]

Definition of terms – Harbours, ports, docks, tides and waves – Site investigation – Planning - Requirements and classification – Concept of satellite ports - Docks – Dry and Wet Docks – Dredgers and dredging – Terminal facilities – Shipping terminal facilities – Essentials of passenger terminal – Port Buildings – Warehouse, Transit sheds – Mooring accessories – Navigational aids – Piers, Breakwaters, Wharves, Jetties, Quays ,Spring fenders – Littoral drift

Total (L: 45 T: 0) = 45 Periods

Text Books :

1. Saxena, S. C. and Arora. S.P., A Text Book of Railway Engineering, DhanpatRai and Sons, Delhi, First Edition, 2010.
2. Khanna, S K. Arora, M G. and Jain S.S, Airport Planning and Design, Nemchand and Brothers, Roorkee, First Edition, 1999.

Reference Books :

1. Subramanian, K.P., Railways, Airport and Harbour Engineering ll, Scitech Publications (India) Pvt. Ltd, Chennai, Second Edition, 2018.
2. Saxena S. C., Airport Engineering Planning and Design, CBS Publisher, New Delhi, First Edition, 2020.
3. Chandra, Railway Engineering, Oxford University Press, New Delhi, Second Edition, 2013.
4. Khanna, S.K. Arora, M.G., Airport, Planning & design, Nemchand & Bros, Roorkee, Sixth Edition,2018.

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Describe various components and their functions in a railway track.*	3	2	3	3	-	-	3	-	3	2	-	-	2	3
CO2	*Summarize the railway track construction, maintenance and operation.*	3	3	-	3	-	-	-	-	3	-	-	-	3	3
CO3	*Explain the concepts of airport planning and the components with its functions.*	-	2			-	2	-	-	-	-	-	-	2	3
CO4	*Plan, analyze and design the elements for orientation of runways and passenger facility systems.*	-	3	2		-	-	-	-	-	-	-	-	3	3
O5	*Describe various features in harbours and ports, their construction, and coastal protection works and provide basic orientation in harbour structural systems.*	3	3	3		-	-	3	-	3	-	-	-	3	3
	Average	3	3	3	3	-	2	3	-	3	2	-	-	3	3

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

20CE512	**FOUNDATION ENGINEERING**	L	T	P	C
		3	0	0	3

Prerequisite: *- Soil Mechanics*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Explain about sampling techniques and selection of foundation based on soil condition.*	*Understand*
CO2:	*Analyze the principle types of foundation and the factors governing the choice of the most suitable type of foundation.*	*Analyze*
CO3:	*Analyze deep foundations*.	*Analyze*
CO4:	*Select suitable types of piles their function and method to find the load carrying capacity of piles.*	*Remember*
CO5:	*Estimate the earth pressure in retaining wall in arithmetic and graphical methods.*	*Evaluate*

UNIT - I SOIL EXPLORATION AND CHOICE OF FOUNDATION [9]

Scope and objectives – Methods of exploration – Auguring and boring – Water boring and rotator drilling – Depth of boring – Spacing of bore hole – Sampling – Disturbed and undisturbed sampling – Sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Geophysical methods – Bore log report – Penetration tests (SPT and SCPT) – Choice of foundation based on soil condition.

UNIT - II SHALLOW FOUNDATION [9]

. Definition – Types, location and depth of foundation – Bearing capacity of shallow foundation – Terzaghi's formula and BIS formula – Factors affecting bearing capacity – Problems – Bearing capacity from in-situ tests (SPT, SCPT and Plate load) - Allowable bearing pressure – Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Methods of minimizing settlement, differential settlement.

UNIT - III FOOTINGS, RAFTS AND MACHINE FOUNDATION [9]

Contact pressure distribution below footings and raft -Isolated and combined footings – Types and proportioning of combined footing – Raft foundation – Types, applications – Floating foundation– Introduction to machine foundation

UNIT - IV PILE FOUNDATION [9]

Types of piles and their function – Factors influencing the selection of pile – Load carrying capacity of Single pile in granular and cohesive soil – Static formula – Dynamic formula (Engineering news and Hiley's) – Capacity from in-situ tests (SPT and SCPT) – Negative skin friction – Group capacity by different methods (Feld's rule, Converse Labarra formula) – Settlement of pile groups – Interpretation of pile load test – Foundation in expansive soil – Under reamed piles.

UNIT - V EARTH PRESSURE AND RETAINING WALLS [9]

Plastic equilibrium in soils – Active and passive earth pressure – Rankine's theory – Cohesionless and cohesive soil – Coloumb's wedge theory – Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann's and Culman's) – Stability of retaining walls.

Total (L: 45 T: 0) = 45 Periods

Text Books :

1 Punmia, B.C., Soil Mechanics and Foundations, Laxmi Publications, New Delhi, Seventeenth Edition, 2017.

2 Murthy, V.N.S., Text Book of Soil Mechanics and Foundation Engineering, CBS Publishers, New Delhi, First Edition, 2018.

Reference Books :

1 Arora, K.R., Soil Mechanics and Foundation Engineering, Standard Publishers & Distributors, Delhi, Seventh Reprint, 2019.

2 Varghese, P.C, Foundation Engineering, Prentice-hall of India Private Limited, New Delhi, Ninth Edition, 2012.

3 Bowles, J.E., Foundation analysis and design, McGraw-Hill, Fifth Edition, 2017.

4 http://nptel.ac.in/courses/105101083/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Describe about sampling techniques and selection of foundation based on soil condition.*	2	3	3	2		2	1				3	2	2	
CO2	*Analyze the principle types of foundation and the factors governing the choice of the most suitable type of foundation.*	2	2	2	2	2		2	1		1				2
CO3	*Analyze deep foundations*.	2	3	2						1		1	2	2	2
CO4	*Select suitable types of piles their function and method to find the load carrying capacity of piles.*	2	3	3	2		2	1			1	3	2	2	
CO5	*Calculate the earth pressure in retaining wall in arithmetic and graphical methods.*	2	3	3		2							2		
	Average	**2**	2	3	3	2	2	2	2	1	1	1	3	2	2

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

20CE513	**CONCRETE TECHNOLOGY**	L	T	P	C
		3	0	0	3

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Evaluate constituent materials of concrete, their testing procedure and requirements as per standard.*	Evaluate
CO2:	*Identify suitable chemical and mineral admixtures based on the required properties of concrete*	Apply
CO3:	*Design a concrete mix which fulfils the required properties for fresh and hardened concrete.*	Create
CO4:	*Summarize fundamental knowledge on fresh and hardened properties of concrete.*	Understand
CO5:	*Select suitable concrete depending on their specific applications and know about future trends in concrete technology.*	Evaluate

UNIT - I CONSTITUENT MATERIALS [9]

Cement-Different types-Chemical composition and Properties-Tests on cement - hydration of cement – IS Specifications-Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements – M-Sand -Water- Quality of water for use in concrete

UNIT - II CHEMICAL AND MINERAL ADMIXTURES [9]

Role of Construction Chemicals - Accelerators – Retarders - Plasticizers- Super plasticizers - Water proofers - Mineral Admixtures - Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag, Rice husk ash and Metakaolin - Their effects on concrete properties

UNIT - III PROPORTIONING OF CONCRETE MIX [9]

Principles of Mix Proportioning - Properties of concrete related to Mix Design - Physical properties of materials required for Mix Design - Design Mix and Nominal Mix - BIS and ACI Methods of Mix Design with examples

UNIT - IV FRESH AND HARDENED PROPERTIES OF CONCRETE [9]

Workability - Tests for workability of concrete - Slump Test, Flow table test, Vee Bee Test and Compaction factor Test-Segregation and Bleeding - Determination of Compressive and Flexural strength as per BIS Properties of Hardened concrete - Determination of Stress-strain curve for concrete - Determination of Young's Modulus-Durability of concrete.

UNIT - V SPECIAL CONCRETES [9]

Light weight and Heavy weight concretes- High strength concrete - Fibre reinforced concrete – Ferrocement- Ready mix concrete – SIFCON - Shotcrete- Polymer concrete - High performance concrete – Self compacting concrete - no-fine concrete - properties and applications

Total (L: 45 T: 0) = 45 Periods

Text Books :

1 Shetty, M.S, and Jain, A.K., Concrete Technology, Theory and Practice, S.Chand and Company Ltd, New Delhi, Eighth Edition, 2018.

2 Santhakumar, A.R., Concrete Technology, Oxford University Press, New Delhi, Second Edition, 2018.

Reference Books :

1 Nevill, A.M, Properties of Concrete, Pearson Education, New Delhi, Fifth Edition, 2012.

2 Gambir, M.L, Concrete Technology: Theory and Practice, Tata McGraw Hill Publishers, New Delhi, Fifth Edition, 2017.

3 IS: 10262-2009 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi.

4 http://nptel.ac.in/courses/105104030

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Evaluate constituent materials of concrete, their testing procedure and requirements as per standard.*	3	3	3	2	-	2	2	-	2	2	2	3	2	3
CO2	*Suggest suitable chemical and mineral admixtures based on the required properties of concrete*	3	3	3	2	2	2	2	-	2	2	2	3	2	2
CO3	*Design a concrete mix which fulfills the required properties for fresh and hardened concrete.*	3	2	3	2	-	2	2	-	2	2	2	3	2	2
CO4	*Get fundamental knowledge on fresh and hardened properties of concrete.*	2	3	3	2	2	2	2	-	2	2	2	3	2	3
CO5	*Select suitable concrete depending on their specific applications and know about future trends in concrete technology.*	3	3	2	2	2	2	3	-	2	2	2	3	2	3
	Average	3	3	3		2	2	3	-	2	2	2	3	2	3

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

		L	T	P	C
20CE514	**STRUCTURAL ANALYSIS - I**	3	0	0	3

Prerequisite: *- Strength of materials*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Analyse the indeterminate pin-jointed plane frame and rigid plane frame by energy and consistent deformation methods*	Analyse
CO2:	*Derive the shear and bending moments for indeterminate structures using slope deflection method and draw the shearing force and bending moment diagrams*	Create
CO3:	*Develop the shear and bending moments for indeterminate structures using moment distribution method and draw the shearing force and bending moment diagrams*	Apply
CO4:	*Evaluate and draw the influence lines for reactions, shear force, and bending moments for determinate structures due to moving load.*	Evaluate
CO5:	*Calculate and draw the influence lines for reactions, shear force and bending moments for indeterminate structures due to moving load.*	Evaluate

UNIT - I INDETERMINATE FRAMES [9]

Basics of Analysis - Degree of static and kinematic indeterminacies for plane frames - analysis of indeterminate pin-jointed frames - rigid frames (Degree of static indeterminacy up to two) - Energy and consistent deformation methods

UNIT - II SLOPE DEFLECTION METHOD [9]

Concepts and assumptions - Continuous beams and rigid frames (with and without sway) – Symmetry and ant symmetry – Yielding of supports

UNIT - III MOMENT DISTRIBUTION METHOD [9]

Concept – Stiffness, distribution and carry over factors – Analysis of continuous beams - Plane rigid frames (with and without sway) – Advantages of symmetric and ant symmetric cases

UNIT - IV INFLUENCE LINES FOR DETERMINATE STRUCTURES [9]

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin-jointed frames – Focal length - Influence lines for reaction SF, BM for determinate beams - Calculation of critical stress resultants due to concentrated and distributed moving loads - Muller-Breslau principle for determinate structures

UNIT - V INFLUENCE LINES FOR INDETERMINATE STRUCTURES [9]

Influence lines for reaction SF, BM for indeterminate beams – Muller Breslau principle – propped cantilever, fixed and continuous beam (redundancy restricted to one degree) and single storey rigid frames

Total (L: 45 T: 0) = 45 Periods

Text Books :

1. Vaidyanadhan, R and Perumal, P., Comprehensive Structural Analysis – Vol.1 & Vol.2, Laxmi Publications, New Delhi,Fourth Edition, 2016.
2. Bhavaikatti, S.S., Structural Analysis – Vol. 1 & Vol. 2., Vikas Publishing Pvt Ltd., New Delhi, Fourth Edition, 2011.

Reference Books :

1. Punmia, B.C.Ashok Kumar Jain. and Arun Kumar Jain., Theory of Structures – SMTS-II, Laxmi Publications, New Delhi, Thirteenth Edition, 2017.
2. Reddy, C.S., Basic Structural Analysis, Tata McGraw-Hill Education, New Delhi, Third Edition, 2011.
3. Vazirani, V.N, Ratwani, M.M and Duggal, S.K., Analysis of Structures – Vol II, Khanna Publishers, New Delhi, Sixteenth Edition, 2011.
4. http://nptel.ac.in/courses/105101085/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Analyse the indeterminate pin-jointed plane frame and rigid plane frame by energy and consistent deformation methods*	3	3	2	3	2					2		3	2	2
CO2	*Derive the shear and bending moments for indeterminate structures using slope deflection method and draw the shearing force and bending moment diagrams*	3	3	2	2	2					2		2	2	2
CO3	*Develop the shear and bending moments for indeterminate structures using moment distribution method and draw the shearing force and bending moment diagrams*	3	3	3	3	3	3		1		2		3	3	3
CO4	*Evaluate and draw the influence lines for reactions, shear force, and bending moments for determinate structures due to moving load*.	3	3	3	3	3	3		1		2		3	3	3
CO5	*Calculate and draw the influence lines for reactions, shear force and bending moments for indeterminate structures due to moving load*.	2	3	3	3	3	3		1		2		3	3	3
	Average	3	3	3	3	3	3		1		2		3	3	3

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

		L	T	P	C
20CE515	**DESIGN OF REINFORCED CONCRETE**	3	0	0	3

Prerequisite: *-*

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Elaborate the concept of elastic method, ultimate load method and limit state method and Interpret codes and specification of working stress method and limit state method*	Create
CO2:	*Analyze, design of beam and slab by limit state method*	Analyze
CO3:	*Summarize the behaviour of RC beams in bond, Anchorage, shear and torsion*	Understand
CO4:	*Discuss the types of columns and design of columns and footings*	Create
CO5:	*Design staircase, flat slab and RC walls*	Create

UNIT - I METHODS OF DESIGN OF CONCRETE STRUCTURES [9]

Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code – Design of beams and slabs by working stress method – RC wall and Shear wall

UNIT - II LIMIT STATE DESIGN FOR FLEXURE [9]

. Analysis and design of singly and doubly reinforced rectangular and flanged beams - Analysis and design of one way, two way slabs subjected to uniformly distributed load for various boundary conditions

UNIT - III LIMIT STATE DESIGN FOR BOND, ANCHORAGE, SHEAR & TORSION [9]

Concept of development length – Design of RC members for bond and Anchorage - Design requirements as per current code - Design of RC members for combined bending shear and torsion.

UNIT - IV LIMIT STATE DESIGN OF COLUMNS AND FOOTINGS [9]

Types of columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending – Design of isolated footing for axial load (pad and isolated)

UNIT - V DESIGN OF STAIR CASE, FLAT SLAB [9]

Design of staircases (open well and doglegged) – Design of flat slabs with and without drop

Total (L: 45 T: 0) = 45 Periods

Text Books :

1 Sinha, S.N., Handbook Reinforced Concrete Design, Tata McGraw-Hill Publishing Company Ltd., New Delhi, First Edition, 2017.

2 Gambhir, M.L., Fundamentals of Reinforced Concrete Design, PHI Learning Pvt. Ltd, New Delhi, First Edition, 2014.

Reference Books :

1 Krishna Raju, N., Design of Reinforced Concrete Structures, CBS Publishers & Distributors, Fourth Edition, New Delhi, 2019.

2 Unnikrishnan Pillai, S. and Devdas Menon., Reinforced Concrete Design, Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, Third Edition, 2017.

3 IS 456:2000, Plain and Reinforced Concrete - Code of Practice (Including Amendment 1, 2, 3,& 4)

4 http://nptel.ac.in/courses/105105105/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Elaborate the concept of elastic method, ultimate load method and limit state method and Interpret codes and specification of working stress method and limit state method*	3	3	3	3						2		3	2	3
CO2	*Analyze, design of beam and slab by limit state method*	3	3	3	2	1	1	2			2	1	2	1	
CO3	*Study the behaviour of RC beams in bond, Anchorage, shear and torsion*	2	3	2	2	3			2		3		2	2	2
CO4	*Discuss the types of columns and design of columns and footings*	3	3	2	2	3	2	2	2		1	2	2		2
CO5	*Design staircase, flat slab and RC walls*	3	3	3	2	3	3		3		3	2	3		2
Average		3	3	3	2	3	3	2	3		3	2	2	2	2

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

		L	T	P	C
20CE516	**WATER SUPPLY ENGINEERING**	3	0	0	3

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to		**Cognitive Level**
CO1:	*Analyse the quantity and quality of water from various sources and estimate water demand.*	Analyse
CO2:	*Select the suitable source of water supply after analysis of water quality and other parameters.*	Apply
CO3:	*Illustrate various process involved in water conveyance system.*	Understand
CO4:	*Select suitable water treatment to be given and design of components of a water treatment plant*	Apply
CO5:	*Choose the appropriate water distribution network for a city and plumbing systems for a building.*	Apply

UNIT - I PLANNING OF WATER SUPPLY SYSTEM [9]

Public water supply system – Planning – Objectives – Design period – Standards and Planning factors for public water supply system – Population forecasts – Variation demand Pattern – Continuous Vs Intermittent Supplies – Water quality analysis and standards

UNIT - II SOURCES OF WATER [9]

.Surface and Ground water sources – Elementary hydrology to compute impounded storage requirements – Mass curve analysis – Wells, Infiltration galleries – Deep tube wells – Construction, development and sanitary protection of wells, Hydraulics of ground water flow – estimating yields of wells – Steady state conditions – Intakes structure

UNIT - III CONVEYANCE OF WATER [9]

Pipes and Channels for transporting water – Hydraulics of pipe flow – Use of charts and Nomograms for flow computations – Materials for pipes and conduits – Selection of Materials and Class for pipes – Laying, Jointing and testing of G.I, C.I,R.C.C pipes – Pumps and pumping stations – Selection of pumps – Series and parallel operation-Water transmission for irrigation system

UNIT - IV TREATMENT OF WATER [9]

Objectives – Unit process of water treatment – Principles, functions and design of flash mixers, floculators, sedimentation tank and sand filters – Principles of disinfection , Water softening, aeration, iron and manganese removal, fluoride removal – Residue management – Demineralization – Desalination – Membrane systems – Recent advances

UNIT - V STORAGE AND DISTRIBUTION OF WATER [9]

Types, functions and requirement of water distribution system – Service reservoirs – Functions and drawings – Network design – Economics – Computer applications – Analysis of distribution network using Hardy Cross method – Equivalent pipes – Elementary methods of pipe sizing – Operation and maintenance – Leak detection – Principles of design of water supply in buildings – House service connection – Fixtures and fittings – Systems of plumbing and drawings of types of plumbing – Introduction to IoT in water supply distribution system.

Total (L: 45 T: 0) = 45 Periods

Text Books :

1 Garg,S.K., Water Supply Engineering,Vol.1,Khanna Publishers, New Delhi, Thirty third Edition, 2017

2 Punmia, B.C. Ashok Kumar Jain. and Arun Kumar Jain., Environmental Engineering (Water Supply Engineering), Laxmi Publications, New Delhi, Second Edition, 2016.

Reference Books :

1 Modi,P.N., Water Supply Engineering, Vol.1, Standard Book House, New Delhi, Sixth Edition, 2018.

2 Paul Guyer, J., An Introduction to Water Supply Systems, Create Space Independent Publishing Platform, California, Second Edition, 2017.

3 Birdie, G.S. and Birdie, J.S, Water Supply and Sanitation Engineering, Dhanpat Rai & Sons, New Delhi, Ninth Edition, 2014.

4 http://nptel.ac.in/courses/105106119/

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Analyse the quantity and quality of water from various sources and estimate water demand.*	3	3	3	3		3	2	2	2	2	2	2	2	3
CO2	*Select the suitable source of water supply after analysis of water quality and other parameters.*	3	3	3	3		3	3	2	2	2	2	2	2	3
CO3	*Illustrate various process involved in water conveyance system.*	3	3	3	3		3	3	2	2	2	2	2	2	3
CO4	*Select suitable water treatment to be given and design of components of a water treatment plant*	3	3	3	3		3	3	2	2	2	2	2	3	3
CO5	*Choose the appropriate water distribution network for a city and plumbing systems for a building.*	3	3	3	3		3	3	2	2	2	2	2	3	3
Average		3	3	3	3		3	3	2	2	2	2	2	3	3

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

20CE521	**ENVIRONMENTAL ENGINEERING LABORATORY**	L	T	P	C
		0	0	3	1

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Perform common environmental experiments relating to water and wastewater quality, and interpret the results.*	*Evaluate*
CO2:	*Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.*	*Apply*
CO3:	*Demonstrate the ability to write clear technical laboratorial reports.*	*Understand*
CO4:	*Analyse the impact of water and wastewater treatment on people and the environment.*	*Analyze*
CO5:	*Apply ethical issues associated with decision making and professional conduct in the laboratorial and field environment*	*Apply*

List of Experiments:

1. Sampling and preservation methods and significance of characterization of water and Waste water.
2. Determination of PH and turbidity
3. Determination of Iron
4. Determination of Fluoride
5. Determination of Hardness
6. Determination of residual chlorine
7. Determination of chlorides
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, dissolved and total solids
12. Determination of B.O.D.
13. Determination of C.O.D.
14. Introduction to Bacteria logical Analysis (Demonstration only)

Total : 45 Periods

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Perform common environmental experiments relating to water and wastewater quality, and interpret the results.*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO2	*Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO3	*Demonstrate the ability to write clear technical laboratorial reports.*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO4	*Analyse the impact of water and wastewater treatment on people and the environment.*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO5	*Apply ethical issues associated with decision making and professional conduct in the laboratorial and field environment*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
Average		3	3	3	3	2	2	3	2	2	2	2	2	3	3

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

20CE522	**CONCRETE LABORATORY**	L	T	P	C
		0	0	3	1

Prerequisite: -

Course Outcomes: On Completion of this course, the student will be able to		***Cognitive Level***
CO1:	*Perform tests on fresh concrete as per IS codes of practice*	*Evaluate*
CO2:	*Carry out testing of hardened concrete as per IS codes of practice*	*Evaluate*
CO3:	*Conduct testing of concrete by Nondestructive test – Rebound hammer*	*Evaluate*
CO4:	*Conduct testing of concrete by Nondestructive test Ultra sonic pulse velocity test*	*Evaluate*
CO5:	*Interpret on quality of concrete as per IS codes of practice*	*Understand*

List of Experiments:

I. Tests on Fresh concrete

1. Slump value
2. Flow table
3. Compaction factor
4. Vee-Bee Consistometer

II. Tests on Hardened concrete

5. Compressive strength
6. Split tensile strength
7. Flexural strength
8. Modulus of Elasticity

III. Non Destructive tests

9. Rebound hammer
10. Ultra sonic pulse velocity

Total : 45 Periods

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	*Perform tests on fresh concrete as per IS codes of practice*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO2	*Carry out testing of hardened concrete as per IS codes of practice*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO3	*Conduct testing of concrete by Nondestructive test – Rebound hammer*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO4	*Conduct testing of concrete by Nondestructive test Ultra sonic pulse velocity test*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
CO5	*Interpret on quality of concrete as per IS codes of practice*	3	3	3	3	2	2	3	2	2	2	2	2	3	3
Average		3	3	3	3	2	2	3	2	2	2	2	2	3	3

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

Course Faculty ` Module Coordinator Chairman BoS/Civil

K.S.R. COLLEGE OF ENGINEERING (Autonomous) **R 2020**

SEMESTER - V

		L	T	P	C
20HR523	**CAREER DEVELOPMENT SKILLS - III**	2	0	0	0

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to		***Cognitive Level***
CO1:	*Understand the nearness of leading various texts.*	*Apply*
CO2:	*Perform well in verbal and logical reasoning.*	*Apply*
CO3:	*Understand and develop the etiquette necessary to present oneself in a professional setting.*	*Understand*
CO4:	*Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.*	*Create*
CO5:	*Enhance the comprehension Skills in core subjects.*	*Apply*

UNIT - I **WRITTEN AND ORAL COMMUNICATION – PART 1** **[06]**

Reading Comprehension Level 3 - Self Introduction - News Paper Review - Self Marketing - Debate- Structured and Unstructured GDs Psychometric Assessment – Types & Strategies to answer the questions Practices: Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Interpretation of Pictorial Representations – Editing.

UNIT - II **VERBAL & LOGICAL REASONING – PART 2** **[06]**

Syllogism - Assertion and Reasons - Statements and Assumptions - Identifying Valid Inferences - identifying Strong Arguments and Weak Arguments - Statements and Conclusions- Cause and Effect - Deriving Conclusions from Passages - Seating Arrangements Practices: Analogies - Blood Relations - Statement & Conclusions.

UNIT - III **QUANTITATIVE APTITUDE – PART 3** **[06]**

Probability - Calendar- Clocks - Logarithms - Permutations and Combinations.

UNIT - IV **QUANTITATIVE APTITUDE – PART 4** **[06]**

Algebra - Linear Equations - Quadratic Equations – Polynomials – Problem on Numbers – Ages – Train – Time and Work – Sudoku – Puzzles.

UNIT - V **DOMAIN PROFICIENCY** **[06]**

Competitive exam training: ENGINERING Mechanics – Mechanics of Solids – Fluid Mechanics – Construction materials - Surveying.

Total (L= 0, T = 30) = 30 Periods

Text Books :

1 Anne Laws, Writing Skills, Orient Black Swan., Hyderabad, 2011.

2 AbhijitGuha, Quantitative Aptitude, TMH, New Delhi,Third Edition,2009

Reference Books :

1 Agarwal. R.S ,A.Modern Approach to Verbal and Non- verbal Reasoning, Revised Edition 2008, Reprint 2009, S.Chand& Co Ltd., New Delhi.

2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.

3 M.B. Lal&Goswami, Objective Instant Arithmetic,Upkar Publications, New Delhi, second edition,2012.

4 Norman Lewis. W.R., "Word Power Made Easy", Goyal Publications

5 Khurmi, R.S., and Gupta, J.K., Civil Engineering - Conventional and Objective type, S. Chand Publishers, New Delhi, First Edition,2018.

Course Faculty ` **Module Coordinator** **Chairman BoS/Civil**