K.S. Rangasamy College of Technology

(Autonomous Institution affiliated to Anna University, Chennai)

CURRICULUM AND SYLLABI

FOR

B.E. Civil Engineering

(For the batch admitted in 2023– 2024)

R2022

Accredited by NAAC A++, Approved by AICTE,
Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215.
Namakkal District, Tamil Nadu, India.

R2/ w.e.f. 03.01.2024
Passed in the BOS Meeting Held on 21.11.2023
Approved in Academic Council Meeting held on 23/12/2023

BOS Chairman

CHAIRMAN
Board of Studies
Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

Department of Civil Engineering

VISION OF THE DEPARTMENT

To empower the graduates to excel as a competent Professional in the areas of Design and Development of Safe, Healthy, Sustainable and Eco friendly Infrastructure for overall development of the Society.

MISSION OF THE DEPARTMENT

- To provide quality education through interdisciplinary research and innovative practices for the Betterment of human society in teaching and learning.
- To develop creative solutions for a wide range of challenges in Civil Engineering by adopting modern Tools and Techniques.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Our graduates are professionally competent in their chosen career and use appropriate techniques and modern Engineering tools in executing projects.

PEO2: Our graduates apply mathematical, scientific and engineering principles to solve complex problems in Civil Engineering through lifelong learning.

PEO3: Our graduates work in multidisciplinary projects with professional and ethical responsibilities.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

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

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

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

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

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

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

PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, 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.

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PROGRAMME SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO1: The graduates will have the ability to plan, analyse, design, execute cost effective project related to Civil Engineering structures with conservation and protection of natural resources for sustainable growth.

PSO2: The graduates will have the ability to take up employment, new start-ups, entrepreneurship, research and development, chartered Engineering professional to serve the society with honesty and integrity.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMMEOUTCOMES (POs)

The B.E. Civil Engineering Programme outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO 1	3	1	3	2	2	1	1	1	2	2	3	1
PEO 2	3	3	3	2	2	1	1	1	2	2	3	1
PEO 3	3	2	3	2	2	1	1	1	3	2	3	1

Contributions: 1- low, 2- medium, 3- high

Year	Sem.	Course Name	PO											
			1	2	3	4	5	6	7	8	9	10	11	12
I	I	Professional English - I								2	3	3	2	3
		Matrices and Calculus	3	3	3	2	2							2
		Physics for Civil Engineering	3	3	3	3	2	3	2	2	2	2	2	3
		Chemistry for Civil Engineering	3	3	3	3	1	3	3	3	3	2	3	3
		Basic Electrical and Electronics Engineering	2	3	1	2	-	-	3	2	-	-	2	3
		Heritage of Tamils (தமிழர் மரபு)							3	3		2		3
		Physics and Chemistry Laboratory	3	3	3	3	3	2	3	2	2	2	2	3
		Basic Electrical and Electronics Engineering Laboratory	3	3	3	3	2	2	2	2	2	2	3	3
	II	Professional English - II								2	3	3	2	3
		Integrals, Partial Differential Equations and Laplace Transform	3	3	3	3	3							2
		C Programming	3	3	3		3				2	2	2	2
		Engineering Drawing for Civil Engineers	3	1	1	1	2				2			2
		Applied Mechanics	3	2	2	3	3	2	3	3	3	3	3	3

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		Environmental Studies and Climate Change	3	3	3	3	3	3	3	3	3	2	2	3
		Tamils and Technology (தமிழரும் தொழில்நுட்பமும்)							3	3		2		3
		C Programming Laboratory	3	3	3		3				3	3	2	2
		Fabrication and Research Engineering Laboratory	3	3	3	2	3	3	2	3	3	1	1	3
		Career Skill Development - I								2	3	3	2	3
II	III	Statistics and Numerical Methods	3	3	3	3	3							2
		Strength of Materials	2	2	3	2	2	1	2	2	3	2	2	1
		Fluid Mechanics and Hydraulics Machinery	3	3		2		3			3	3		2
		Surveying	3	3	3	2	2	2	2	2	3	3	2	3
		Construction Materials and Practices	3	2	2	2	3	2	3	2	2	2	2	3
		Engineering Geology	3	2	2	2	3	2	2	2	2	2	2	3
		Fluid Mechanics and Hydraulics Engineering Laboratory	3	2	2	2		2			2			
		Surveying Laboratory	3	2	3	3		3			2			
		Career Skill Development- II								2	3	3	2	3
II	IV	Structural Analysis I	2	2	1	2	3	3	2	1	1		1	2
		Soil Mechanics	3	2	2	3	3	2	3	3	3	3	3	3
		Water Supply and Wastewater Engineering	3	3	2		1	3	3	3	1	2	1	3
		Concrete Technology	3	3	3	3	2	3	3	2	2	2	2	2
		Open Elective – I												
		Universal Human Value (UHV)*												
		Building Planning and Drawing Laboratory	1		2	3		2	3	3	3	3	3	3
		Materials Testing Laboratory	3	2	2	3	2	2	2	2	3	2	2	2
		Career Skill Development - III	3	3	3	3		2				2	3	3
III	V	Structural Analysis II	3	3	3	3	2	3	3	3	3	2	3	3
		Foundation Engineering	3	3	3	3	2	3	3	3	3	2	3	3
		Basic Reinforced Concrete Design	3	3	3	3	2	3	3	3	3	2	3	3
		Highway, Railway and Airport Engineering	3	2	3	2	3	1	1	3	2	1		3

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		Professional Elective I												
		Start-ups and Entrepreneurship	3	3	3	3	3	2	2	1		1	3	3
		Geotechnical Engineering Laboratory	3	2	3	2	2	3	3	3	3	2	3	3
		Environmental Engineering Laboratory	3	3	2	3	1	3	3	2		2		2
		Career Skill Development - IV								2	3	3	2	3
		Internship												
III	VI	Advanced Reinforced Concrete Design	1	2	3					3			3	
		Design of Steel Structures	3	3	3	2	2	3	3	3	3	2	3	3
		Construction Planning and Management	3	2	2	3		2	3			1	1	3
		Hydrology and Water Resources Engineering	3	2	1	2		1	2			1		
		Professional Elective II												
		Open Elective – II												
		NCC\NSS\NSO\YRC\RRC\ Yoga\Fine Arts												
		Concrete and Highway Laboratory	3	2	3	3	2	2	2	2	3	2	2	2
		Computer Aided Analysis and Design Laboratory	3	3	3	3	3	2	1	1	3	3	3	1
		Miniproject	1	1	2	3	2	1	1		3		1	1
		Comprehensive Test	3	3	2	2					1	2	2	3
		Internship												

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TIRUCHENGODE - 637 215

K.S. RANGASAMY COLLEGE OF TECHNOLOGY

Credit Distribution for B.E(Civil) Programme–2022 –2023 Batch

SUMMARY

S.No.	Category	Credits Per Semester								Total Credits	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	2	2	-	-	-	-	3	-	**07**	**04.32**
2.	BS	12	4	4	-	-	-	-	-	**20**	**12.34**
3.	ES	5	11	-	-	-	-	-	-	**16**	**09.88**
4.	PC	-	4	19	18	19	19	6	-	**85**	**52.47**
5.	PE	-	-	-	-	3	3	6	3	**15**	**09.26**
6.	OE	-	-	-	3	-	3	3	-	**09**	**05.56**
7.	CG	-	1*	1*	1*	1*	-	2	8	**10**	**06.17**
8.	MC	-	-		3*	3*	-	-	-	**09***	-
9.	AC	-	-	-	-	-	-	0	0	0	0
Total		**19**	**21**	**23**	**21**	**22**	**25**	**20**	**11**	**162**	**100**

HS - HUMANITIESANDSOCIALSCIENCES
BS - BASICSCIENCE
ES - ENGINEERINGSCIENCES
PC - PROFESSIONALCORE
PE - PROFESSIONALELECTIVES
OE - OPENELECTIVES
CG –CAREER GUIDANCE COURSES
MC - MANDATORYCOURSES
AC- AUDIT COURSES

Open Electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch

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HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 EN 001	Professional English - I	HS	2	1	1	0	2	-NIL-
2.	60 EN 002	Professional English - II	HS	2	1	1	0	2	-NIL-
3.	60 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3	-NIL-
4.	60 AB 00*	NCC/NSS/NSO/YRC/RRC/ Fine Arts*	HS	-	-	-	-	3*	-NIL-

BASIC SCIENCE (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 MA 001	Matrices and Calculus	BS	4	3	1	0	4	-NIL-
2.	60 PH 002	Physics for Civil Engineering	BS	3	3	0	0	3	-NIL-
3.	60 CH 002	Chemistry for Civil Engineering	BS	3	3	0	0	3	-NIL-
4.	60 CP 0P1	Physics and Chemistry Laboratory	BS	4	0	0	4	2	-NIL-
5.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	4	3	1	0	4	-NIL-
6.	60 MA 007	Statistics and Numerical Methods	BS	4	3	1	0	4	-NIL-

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE 101	Engineering Drawing for Civil Engineers	ES	6	2	0	4	4	-NIL-
2.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	-NIL-
3.	60 CS 001	C Programming	ES	3	3	0	0	3	-NIL-
4.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3	-NIL-
5.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	-NIL-
6.	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	ES	6	2	0	4	4	-NIL-

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PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	61 CE 201	Applied Mechanics	PC	4	3	1	0	4	Applied Physics
2.	61 CE 301	Strength of Materials	PC	4	3	1	0	4	Applied Mechanics
3.	60 CE 302	Fluid Mechanics and Hydraulics Machinery	PC	4	3	1	0	4	Elements of Civil Engineering & Mechanics
4.	60 CE 303	Surveying	PC	3	3	0	0	3	NIL
5.	60 CE 304	Construction Materials and Practices	PC	3	3	0	0	3	NIL
6.	60 CE 305	Engineering Geology	PC	3	3	0	0	2	Basic Sciences
7.	60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	PC	4	0	0	4	2	Fluid Mechanics and Hydraulics Machinery
8.	60 CE 3P2	Surveying Laboratory	PC	4	0	0	4	2	Basic Survey Theory
9.	60 CE 401	Structural Analysis I	PC	4	3	1	0	4	Strength of Materials
10.	60 CE 402	Soil Mechanics	PC	4	3	1	0	4	Engineering Geology
11.	60 CE 403	Water Supply and Wastewater Engineering	PC	3	3	0	0	3	NIL
12.	60 CE 404	Concrete Technology	PC	3	3	0	0	3	Construction Materials
13.	60 CE 4P1	Building Planning and Drawing Laboratory	PC	4	0	0	4	2	Nil
14.	60 CE 4P2	Materials Testing Laboratory	PC	4	0	0	4	2	Strength of Materials
15.	60 CE 501	Structural Analysis II	PC	4	3	1	0	4	Structural Analysis I
16.	60 CE 502	Foundation Engineering	PC	4	3	1	0	4	Soil Mechanics
17.	60 CE 503	Basic Reinforced Concrete Design	PC	4	3	1	0	4	Strength of Materials
18.	60 CE 504	Highway, Railway and Airport Engineering	PC	3	3	0	0	3	Surveying
19.	60 CE 5P1	Geotechnical Engg. Lab	PC	4	0	0	4	2	Soil Mechanics, Foundation Engineering
20.	60 CE 5P2	Environmental Engineering Laboratory	PC	4	0	0	4	2	Water Supply Engineering, Wastewater Engineering
21.	60 CE 601	Advanced Reinforced concrete Design	PC	4	3	1	0	4	Basic Reinforced Concrete Design
22.	60 CE 602	Design of Steel Structures	PC	4	3	1	0	4	Nil
23.	60 CE 603	Construction Planning and	PC	3	3	0	0	3	Nil

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		Management							
24.	60 CE 604	Hydrology and Water Resources Engineering	PC	3	3	0	0	3	Nil
25.	60 CE 6P1	Concrete and Highway Laboratory	PC	4	0	0	4	2	Concrete Technology
26.	60 CE 6P2	Computer Aided Analysis and Design Laboratory	PC	4	0	0	4	2	Nil
27.	60 CE 701	Prestressed Concrete	PC	5	3	2	0	4	Nil
28.	60 CE 7P1	Estimation and Quantity Surveying Laboratory	PC	3	0	0	2	2	Nil

PROFESSIONAL ELECTIVES (PE)

SEMESTER V, PROFESSIONAL ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60CEE11	Smart Materials and Smart Structures	PE	3	3	0	0	3	Structural Engineering
2.	60CEE12	Solid and Hazardous Waste management	PE	3	3	0	0	3	Environmental Engineering
3.	60CEE13	Ground Improvement Techniques	PE	3	3	0	0	3	Geotechnical Engineering
4.	60CEE14	Traffic Engineering and Management	PE	3	3	0	0	3	Highway and Railway Engineering
5.	60CEE15	Conceptual planning and Bye Laws	PE	3	3	0	0	3	Construction Management
6.	60CEE16	Groundwater Engineering	PE	3	3	0	0	3	Water Resource Engineering

SEMESTER VI, PROFESSIONAL ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60CEE21	Experimental Stress Analysis	PE	3	3	0	0	3	Structural Engineering
2.	60CEE22	Air Pollution Management	PE	3	3	0	0	3	Environmental Engineering
3.	60CEE23	Bridge Engineering	PE	3	3	0	0	3	Geotechnical Engineering
4.	60CEE24	Transportation Planning	PE	3	3	0	0	3	Highway and Railway Engineering
5.	60CEE25	Construction Techniques and Equipments	PE	3	3	0	0	3	Construction Management
6.	60CEE26	Water Resources Systems Engineering	PE	3	3	0	0	3	NIL

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SEMESTER VII, PROFESSIONAL ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60CEE31	Repair and Rehabilitation of Structures	PE	3	3	0	0	3	Structural Engineering
2.	60CEE32	Energy science and Engineering	PE	3	3	0	0	3	NIL
3.	60CEE33	Dynamics and Earthquake Engineering	PE	3	3	0	0	3	Engineering Geology Geotechnical Engineering
4.	60CEE34	Pavement Analysis and Design	PE	3	3	0	0	3	Transportation Engineering
5.	60CEE35	Building Services	PE	3	3	0	0	3	NIL
6.	60CEE36	Watershed Conservation and Management	PE	3	3	0	0	3	Water Resource Engineering

SEMESTER VIII, PROFESSIONAL ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60CEE41	Prefabricated Structures	PE	3	3	0	0	3	Structural Engineering
2.	60CEE42	Industrial Waste Management	PE	3	3	0	0	3	Environmental Engineering
3.	60CEE43	Reinforced Earth and Geotextiles	PE	3	3	0	0	3	Geotechnical Engineering
4.	60CEE44	Intelligent Transport Systems	PE	3	3	0	0	3	NIL
5.	60CEE45	Quality Control and Assurance	PE	3	3	0	0	3	NIL
6.	60CEE46	Integrated Water Resources Management	PE	3	3	0	0	3	NIL

SEMESTER VIII, PROFESSIONAL ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60CEE51	Disaster Management	PE	3	3	0	0	3	Structural Engineering
2.	60CEE52	Advanced Environmental Engineering	PE	3	3	0	0	3	Environmental Engineering
3.	60CEE53	Machine Foundation	PE	3	3	0	0	3	Foundation Engineering
4.	60CEE54	Urban Planning and Development	PE	3	3	0	0	3	NIL
5.	60CEE55	Safety in Construction	PE	3	3	0	0	3	Construction Management
6.	60CEE56	Water Quality and Management	PE	3	3	0	0	3	NIL

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MANDATORY COURSES (MC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0	Nil
2.	60 MY 002	Universal Human Values	MC	3	2	2	0	3	Nil
3.	60 MY 003	Start-ups & Entrepreneurship	MC	2	2	0	0	0	Nil

SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 AC 001	Research Methodology - I	AC	1	1	0	0	0	Nil
2.	60 AC 002	Research Methodology - II	AC	1	1	0	0	0	Research Methodology - I

OPEN ELECTIVES I / II / III / IV (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CE L01	Waste Management techniques	OE	3	3	0	0	3	Nil
2.	60 CE L02	Climatic Changes and Adaptation Measures	OE	3	3	0	0	3	Nil
3.	60 CE L03	Application of Remote sensing and GIS in Engineering	OE	3	3	0	0	3	Nil
4.	60 CE L04	Road safety and Planning	OE	3	3	0	0	3	Nil
5.	60 CE L05	Environment and Ecology	OE	3	3	0	0	3	Nil
6.	60 CE L06	Architectural Engineering	OE	3	3	0	0	3	Nil
7.	60 CE L07	Forensic Engineering	OE	3	3	0	0	3	Nil
8.	60 CE L08	Sustainable Infrastructure	OE	3	3	0	0	3	Nil
9.	60 CE L09	Fundamentals of Civil Engineering	OE	3	3	0	0	3	Nil
10.	60 CE L10	Urban and Regional Planning	OE	3	3	0	0	3	Nil

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EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 CG 0P1	Career Skill Development- I	CGC	2	2	0	0	1*	Nil
2.	60 CG 0P2	Career Skill Development- II	CGC	2	0	0	2	1*	Nil
3.	60 CG 0P3	Career Skill Development- III	CGC	2	0	0	2	1*	Nil
4.	60 CG 0P4	Career Skill Development- IV	CGC	2	0	0	2	1*	Nil
5.	60 CG 0P5	Comprehension Test	CGC	2	0	0	2	0	Nil
6.	60 CE 7P2	Project Work - I	CGC	4	0	0	4	2	Nil
7.	60 CE 8P1	Project Work - II	CGC	4	0	0	4	8	Nil
8.	60 CG 0P6	Internship	CGC		-	-	-	1/2/3*	Nil

GENERAL ELECTIVE (GE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre-requisite
1.	60 AB 001	National Cadet Corps (Air Wing)	HS	5	2	0	2	3	-NIL-
2.	60 AB 002	National Cadet Corps (Army Wing)	HS	5	2	0	2	3	-NIL-

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Passed in the BOS Meeting Held on 21.11.2023
Approved in Academic Council Meeting held on 23/12/2023

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K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY,TIRUCHENGODE -637215
(An Autonomous Institutionaffiliatedto Anna University)
COURSES OF STUDY
(For the candidates admitted from 2022-2023 onwards)
SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1		Induction Programme	-	-	-	-	-	**0**
THEORY								
2.	60 EN 001	Professional English I	HS	3	1	0	2	2
3.	60 MA 001	Matrices and Calculus	BS	4	3	1	0	4
4.	60 PH 002	Physics for Civil Engineering	BS	3	3	0	0	3
5.	60 CH 002	Chemistry for Civil Engineering	BS	3	3	0	0	3
6.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
7.	60 GE 001	Heritage of Tamils (தமிழர் மரபு)	GE	1	1	0	0	1[$]
PRACTICALS								
8.	60 CP 0P1	Physics and Chemistry Laboratory	BS	4	0	0	4	2
9.	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2
			Total	**25**	**14**	**1**	**10**	**19**

I to VII semester
NCC[%] - Course can be waived with 3 credits in VII semester or offered as extra credits
NSS/NSO/YRC/RRC/Fine Arts[%] 3 credits is not accounted for CGPA
Career Skill Development (CSD) [*] - Extra 1 credit is offered and not accounted for CGPA.
I to VIII semester
Internship 3 additional credits not accounted for CGPA is offered based on the Internship duration
Heritage of Tamils[&] additional 1 credit is offered and not account for CGPA.

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 EN 002	Professional English II	HS	3	1	0	2	2
2.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	4	3	1	0	4
3.	60 CS 001	C Programming	ES	3	3	0	0	3
4.	60 CE 101	Engineering Drawing for Civil Engineers	ES	6	2	0	4	4
5.	61 CE 201	Applied Mechanics	PC	4	3	1	0	4
6.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0
7.	60 GE 002	Tamils and Technology(தமிழரும் தொழில்நுட்பமும்)	GE	1	1	0	0	1[$]
PRACTICALS								
8.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2
9.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2
10.	60 CG 0P1	Career Skill Development - I	CG	2	0	0	2	1[*]
			Total	**33**	**15**	**2**	**16**	**21**

- Tamils and Technology[&] Extral1 credit is offered and not account for CGPA.

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SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 MA 007	Statistics and Numerical Methods	BS	4	3	1	0	4
2.	61 CE 301	Strength of Materials	PC	4	3	1	0	4
3.	60 CE 302	Fluid Mechanics and Hydraulics Machinery	PC	4	3	1	0	4
4.	60 CE 303	Surveying	PC	3	3	0	0	3
5.	60 CE 304	Construction Materials and Practices	PC	3	3	0	0	3
6.	60 CE 305	Engineering Geology	PC	3	3	0	0	2
PRACTICALS								
7.	60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	PC	4	0	0	4	2
8.	60 CE 3P2	Surveying Laboratory	PC	4	0	0	4	2
9.	60 CG 0P2	Career Skill Development - II	**CG**	2	0	0	2	1*
10.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				31	**18**	**3**	**10**	**24**

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE 401	Structural Analysis I	PC	4	3	1	0	4
2.	60 CE 402	Soil Mechanics	PC	4	3	1	0	4
3.	60 CE 403	Water Supply and Wastewater Engineering	PC	3	3	0	0	3
4.	60 CE 404	Concrete Technology	PC	3	3	0	0	3
5.	60 CE L*	Open Elective – I	OE	3	3	0	0	3
6.	60 MY 002	Universal Human Value (UHV)*	MC	3	3	0	0	3*
PRACTICALS								
7.	60 CE 4P1	Building Planning and Drawing Laboratory	PC	4	0	0	4	2
8.	60 CE 4P2	Materials Testing Laboratory	PC	4	0	0	4	2
9.	60 CG 0P3	Career Skill Development - III	**CG**	2	0	0	2	1*
10.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				30	**18**	**2**	**10**	**21**

- UHV# additional 3 credit is offered and not accounted for CGPA

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SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE 501	Structural Analysis II	PC	4	3	1	0	4
2.	60 CE 502	Foundation Engineering	PC	4	3	1	0	4
3.	60 CE 503	Basic Reinforced Concrete Design	PC	4	3	1	0	4
4.	60 CE 504	Highway, Railway and Airport Engineering	PC	3	3	0	0	3
5.	60 CE E*	Professional Elective I	PE	3	3	0	0	3
6.	60 MY 003	Start-ups and Entrepreneurship	MC	2	2	0	0	0
PRACTICALS								
7.	60 CE 5P1	Geotechnical Engineering Laboratory	PC	4	0	0	4	2
8.	60 CE 5P2	Environmental Engineering Laboratory	PC	4	0	0	4	2
9.	60 CG 0P4	Career Skill Development - IV	**CG**	2	0	0	2	1*
10.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				30	**17**	**3**	**10**	**22**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE 601	Advanced Reinforced Concrete Design	PC	4	3	1	0	4
2.	60 CE 602	Design of Steel Structures	PC	4	3	1	0	4
3.	60 CE 603	Construction Planning and Management	PC	3	3	0	0	3
4.	60 CE 604	Hydrology and Water Resources Engineering	PC	3	3	0	0	3
5.	60 CE E*	Professional Elective II	PE	3	3	0	0	3
6.	60 CE L**	Open Elective – II	OE	3	3	0	0	3
7.	60 AB 00*	NCC\NSS\NSO\YRC\RRC\Yoga\Fine Arts	HS	4	2	0	2	3%
PRACTICALS								
8.	60 CE 6P1	Concrete and Highway Laboratory	PC	4	0	0	4	2
9.	60 CE 6P2	Computer Aided Analysis and Design Laboratory	PC	4	0	0	4	2
10.	60 CE 6P3	Miniproject	PC	2	0	0	2	1&
11.	60 CG 0P5	Comprehensive Test	CG	2	0	0	2	1*
12.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				36	**20**	**2**	**10**	**24**

Comprehension Test* -one additional credit is offered and not accounted for CGPA calculation
Miniproject& - 1 additional credit is offered and not accounted for CGPA calculation

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SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	60 CE 701	Prestressed Concrete	PC	4	4	1	0	4
3.	60 CE E*	Professional Elective III	PE	3	3	0	0	3
4.	60 CE E*	Professional Elective IV	PE	3	3	0	0	3
5.	60 CE L*	Open Elective – III	OE	3	3	0	0	3
6.	60 AC 001	Research Methodology I	AC	1	1	0	0	0
7.	60 AB 00*	NCC\NSS\NSO\YRC\RRC\Yoga\Fine Arts	HS	4	2	0	2	3%
PRACTICALS								
8.	60 CE 7P1	Estimation and Quantity Surveying Laboratory	PC	4	1	0	2	2
9.	60 CE 7P2	Project Work - I	CG	4	0	0	4	2
10.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				29	**20**	**1**	**8**	**20**

NCC% - Course can be waived with 3 credits in VII semester or offered as extra 3 credits.
NSS/NSO/YRC/RRC/Fine Arts% 3 extra credits not accounted for CGPA

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CE E*	Professional Elective - V	PE	3	3	0	0	3
2.	60 AC 002	Research Methodology II	AC	1	1	0	0	0
PRACTICALS								
3.	60 CE 8P1	Project Work - II	CG	4	0	0	4	8
4.	60 CG 0P6	Internship	CG		-	-	-	1/2/3*
				8	**4**	**0**	**4**	**11**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 162

Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES-Engineering Science Courses, PE-Professional Core Courses, PE-Professional Elective Courses,

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GE- General Elective Courses, OE- Open Elective Courses, CG - Career Enhancement Course, MC- Mandatory Courses

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

FIRSTSEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 EN 001	Professional English - I	2	40	60	100	45	100
2	60 MA 001	Matrices and Calculus	2	40	60	100	45	100
3	60 PH 002	Physics for Civil Engineering	2	40	60	100	45	100
4	60 CH 002	Chemistry for Civil Engineering	2	40	60	100	45	100
5	60 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100
6	60 GE 001	Heritage of Tamils (தமிழர் மரபு)	GE	100	-	100	-	-
PRACTICAL								
7	60 CP 0P1	Physics and Chemistry Laboratory	3	60	40	100	45	100
8	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	3	60	40	100	45	100

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* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test pape follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

60 EN 001	Professional English – I	Category	L	T	P	Credit
		HS	1	1	0	2

Objective

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Prerequisite

Basic knowledge of reading and writing in English.

Course Outcomes

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

CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyze
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Express their opinions effectively in both oral and written medium of communication	Analyze

Mapping with Programme Outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1								2	3	3	2	3	2	3
CO 2								2	3	3	2	3	2	3
CO 3								2	3	3	2	3	2	3
CO 4								2	3	3	2	3	2	3
CO 5								2	3	3	2	3	2	3
3- Strong;2-Medium;1-Some														

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Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	10
Apply (Ap)	20	20	40
Analyse (An)	30	30	50
Create (Cr)	0	0	0

Syllabus

K.S.Rangasamy College ofTechnology–AutonomousR2022

Professional English I

Common to All Branches

Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
I	1	1	0	30	2	40	60	100

Introduction to Fundamentals of Communication* **Listening:** General information-specific details-conversation: introduction to classmates – audio / video (formal & informal). **Speaking:** Self Introduction; Introducing a friend; conversation - politeness strategies. **Reading:** Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. **Writing:** Writing letters – informal and formal – basics and format orientation **Language Focus:** Present Tenses; word formation (affixes); synonyms, antonyms and contranyms, and phrasal verbs; abbreviations & acronyms (as used in technical contexts).	**[3]**
Narration and Summation* **Listening:** Podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities. **Speaking:** Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews. **Reading:** Biographies, travelogues, newspaper reports, excerpts from literature, and travel & technical blogs. **Writing:** Paragraph writing, short report on an event (field trip etc.). **Language Focus**: Past tenses and prepositions; One-word substitution.	**[3]**
Description of a process / product* **Listening:** Listen to a product and process descriptions; advertisements about products or services **Speaking**: Picture description; giving instruction to use the product; presenting a product. **Reading**: Advertisements, gadget reviews and user manuals. **Writing:** Definitions; instructions; and product /process description. **Language Focus**: Imperatives; comparative adjectives; future tenses. Homonyms; and Homophones, discourse markers (connectives & sequence words)	**[3]**

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Classification and Recommendations* **Listening:** TED Talks; scientific lectures; and educational videos. **Speaking**: Small Talk; Mini presentations **Reading**: Newspaper articles and Journal reports **Writing:** Note-making / Note-taking; recommendations; Transferring information from non-verbal (chart, graph etc, to verbal mode) **Language Focus**: Articles; Pronouns -Possessive & Relative pronouns; ; subject-verb agreement; collocations.	**[3]**
Expression* **Listening:** Debates/ discussions; different viewpoints on an issue; and panel discussions. **Speaking**: Group discussions, debates & role plays. **Reading**: Editorials; and opinion blogs. **Writing**: Essay Writing (Descriptive or narrative). **Language Focus**: Punctuation; Compound Nouns; simple, compound & complex sentences. Cause & effect expressions.	**[3]**
	Total Hours: 15 + 15(Tutorial) : 30 hours

Textbook(s):	
1.	*'English for Engineers & Technologists'* Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020
Reference(s):	
1.	Paul Emmerson and Nick Hamilton, *'Five Minute Activities for Business English',* Cambridge University Press, New York, 2005
2.	Arthur Brookes and Peter Grundy,' *Beginning to Write: Writing Activities for Elementary and Intermediate Learners',* Cambridge University Press, New York, 2003
3.	Michael McCarthy and Felicity O Dell, *'English Vocabulary in Use: Upper Intermediate',* Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, *'A Course Book on Technical English'*Scitech Publications (India) Pvt. Ltd. 2020

*** SDG- 04- Quality Education**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Introduction to Fundamentals of Communication**	
1.1	Listening for general information and Specific details	1
1.2	Self-introduction	1
1.3	Narrating personal experiences	1
1.4	Reading relevant to technical contexts and emails	1
1.5	Writing letters – informal	1
1.6	Writing letters - formal	1
1.7	Present Tenses	1
1.8	synonyms, antonyms and contranyms, and affixes	1
1.9	phrasal verbs; abbreviations & acronyms	1
2	**Narration and Summation**	

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2.1	Listening to podcasts, documentaries and interviews with celebrities	1
2.2	Narrating personal experiences	1
2.3	Summarizing of documentaries	1
2.4	Reading travelogues, and excerpts from literature	1
2.5	Paragraph writing	1
2.6	Short report on an event (field trip etc.).	1
2.7	Past tenses	1
2.8	Prepositions	1
2.9	One-word substitution	1
3	**Description of a process / product**	
3.1	Listen to a product and process descriptions	1
3.2	Picture description	1
3.3	Giving instruction to use the product	1
3.4	Reading Advertisements, gadget reviews and user manuals	1
3.5	Writing Definitions and instructions	1
3.6	Future Tenses	1
3.7	Homonyms and Homophones	1
3.8	Imperatives	1
3.9	comparative adjectives, and discourse markers	1
4	**Classification and Recommendations**	
4.1	Listening to TED Talks and educational videos	2
4.2	Listening to scientific lectures	1
4.3	Small Talk and mini presentations	2
4.4	Reading newspaper articles and journal reports	2
4.5	Note-making / Note-taking	1
4.6	Recommendations	1
4.7	Transferring information from non-verbal	1
4.8	Articles and Pronouns	2
4.9	Subject-verb agreement and collocations	
5	**Expression**	
5.1	Listening to debates and panel discussions	1
5.2	Group discussions	2
5.3	Role plays	1
5.4	Reading editorials and opinion blogs	1
5.5	Essay Writing (Descriptive or narrative)	1
5.6	Punctuation and cause & effect expressions.	1
5.7	Compound Nouns	1
5.8	Simple, compound & complex sentences	1
	Total	**45**

Course Designers

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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60 MA 001	Matrices and Calculus	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

1. To familiarize the students with basic concepts in Cayley-Hamilton theorem and orthogonal transformation.
2. To get exposed to the fundamentals of differential calculus in various methods.
3. To acquire skills to understand the concepts involved in Jacobians and maxima and minima.
4. To solve various linear differential equations and method of variation of parameters.
5. To learn various techniques and methods in solving definite and indefinite integrals.

Pre-requisites

-NIL-

Course Outcomes

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

CO1	Apply Cayley-Hamilton theorem and reduce the quadratic form into canonical form.	Remember, Apply, Evaluate
CO2	Apply differential calculus in solving various Engineering problems.	Remember, Understand, Apply
CO3	Analyze Jacobian methods and constrained maxima and minima of the functions.	Remember, Understand, Analyze
CO4	Apply various methods in solving the differential equations.	Remember, Apply
CO5	Evaluate definite and indefinite integrals using different techniques**.**	Remember, Apply, Evaluate

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3							2		3
CO2	3	3	2	2	3							2		3
CO3	3	3	3	2	3							2		3
CO4	3	3	3	3	3							2		3
CO5	3	3	3	2	3							2		3
3- Strong;2-Medium;1-Some														

Assessment Pattern

Bloom'sCategory	Continuous AssessmentTests (Marks)		Model Exam (Marks)	End Sem Examination (Marks)
	1	2		
Remember (Re)	10	10	10	10
Understand (Un)	10	10	10	10
Apply (Ap)	30	20	40	40
Analyze (An)	0	20	20	20
Evaluate (Ev)	10	0	20	20
Create (Cr)	0	0	0	0
Total	60	60	100	100

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Syllabus

K.S.RangasamyCollegeofTechnology–AutonomousR2022								
Matrices and Calculus								
Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT, AI&DS,								
Semester	Hours/Week			Total Hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	40	60	

Matrices Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors –Cayley-Hamilton theorem-Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by an Orthogonal transformation - Nature of quadratic form – Applications : Stretching of an elastic membrane.	[9]
Differentiation Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) – Successive Differentiation-Leibnitz's theorem- **Applications: Maxima and Minima of functions of one variable.***	[9]
Functions of Several Variables Partial differentiation – Homogeneous functions and Euler's theorem – Jacobians – Taylor's series for functions of two variables – **Applications: Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's Method of Undetermined Multipliers***	[9]
Differential Equations Linear differential equations of second and higher order with constant coefficients - R.H.S is of the form $e^{ax}, \sin ax, \cos ax, x^n, n > 0$ - Differential equations with variable coefficients: Cauchy's and Legendre's form of linear equations - Method of variation of parameters. .	[9]
Integration Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centers of mass.	[9]
TotalHours	**60**

TextBook(s):	
1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.
Reference(s):	
1.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10thEdition, John Wiley and Sons (Asia) Limited,New Delhi, 2016.
2.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand& Company Ltd, New Delhi, 2017
3.	Bali N P and Manish Goyal," A text book of Engineering Mathematics",10thEdition, Laxmi Publications
4.	"Matrix Analysis with Applications" Dr Gupta S K and DrSanjeev Kumar and Prof. Somnath Roy "Matrix Solvers", NPTEL Online Video Courses.

***SDG: 4 – Quality Education**

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Course Contents and Lecture Schedule

S.No.	Topic	Number of Hours
1	**Matrices**	
1.1	Characteristic equation	1
1.2	Eigen values and Eigen vectors of a real matrix	1
1.3	Properties of Eigen values and Eigen vectors	1
1.4	Cayley-Hamilton theorem	1
1.5	Tutorial	2
1.6	Orthogonal transformation of a symmetric matrix to diagonal form	1
1.7	Reduction of quadratic form to canonical form by Orthogonal transformation	1
1.8	Nature of quadratic form	1
1.9	Stretching of an elastic membrane	1
1.10	Tutorial	2
2	**Differentiation**	
2.1	Representation of functions	1
2.2	Limit of a functionand Continuity	1
2.3	Differentiation rules (sum, product, quotient, chain rules)	2
2.4	Successive differentiation	1
2.5	Tutorial	2
2.6	Leibnitz's theorem	1
2.7	Maximaandminimaoffunctionsof onevariable	2
2.8	Tutorial	2
3	**Functions of Several Variables**	
3.1	Partial differentiation	1
3.2	Homogeneous functions and Euler's theorem	1
3.3	Jacobians	2
3.4	Tutorial	2
3.5	Taylor's series for functions of two variables	1
3.6	Maxima and minima of functions of two variables	1
3.7	Lagrange's Method of Undetermined Multipliers	2
3.8	Tutorial	2
4	**Differential Equations**	
4.1	Linear differential equations of second and higher order with constant co-efficient	1
4.2	R.H.S is of the form e^{ax}, $\sin \alpha x$, $\cos \alpha x$, $x^n, n > 0$	2
4.3	Tutorial	2
4.4	Differential equations with variable coefficients: Cauchy's form of linear equations	2
4.5	Differential equations with variable coefficients: Legendre's	2

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	form of linear equations	
4.6	Method of variation of parameters	1
4.7	Tutorial	2
5	**Integration**	
5.1	Definite and Indefinite integrals	1
5.2	Substitution rule	1
5.3	Techniques of Integration: Integration by parts	1
5.4	Integration of rational functions by partial fraction	1
5.5	Tutorial	2
5.6	Integration of irrational functions	1
5.7	Improper integrals	1
5.8	Hydrostatic force.	1
5.9	Pressure, moments and centres of mass.	1
5.10	Tutorial	2
	Total	60

Course Designers

1. Dr.C.Chandran - cchandran@ksrct.ac.in
2. Mr. G.Mohan - mohan@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Matrix Operations - Addition, Multiplication, Transpose, Inverse and Rank.
3. Solution of system of linear equations.
4. Computation of Eigen values and Eigen vectors of a Matrix.
5. Finding ordinary and partial derivatives.
6. Solving first and second order ordinary differential equations.
7. Computing Maxima and Minima of a function of one variable.
8. Computing Maxima and Minima of a function of two variables.

60 PH 002	PHYSICS FOR CIVIL ENGINEERING (B.E. CIVIL)

Category	L	T	P	Credit
BS	3	0	0	3

Objective(s)

1. To analyze the crystal structures of solids and to gain knowledge of properties of materials
2. To enrich the understanding of properties of materials and their applications in engineering and technology
3. To explain the principles of laser, types and demonstrate the applications of laser
4. To introduce the concepts of acoustics, production of ultrasonic waves and lighting designs
5. To study the advanced materials and nanotechnology for various engineering applications

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Prerequisite
Nil
Course Outcomes
On the successful completion of the course, students will be able to

CO1	Comprehend basics of crystallography and its importance for varied materials properties	Understand
CO2	Assess the engineering problems like plastic deformation, slip and twinning by material testing methods	Understand
CO3	Utilize a strong foundational knowledge in lasers and its applications	Apply
CO4	Recognize the characteristics of sound and suggestions for buildings with good acoustics	Apply & Analyse
CO5	Interpret the properties of advanced materials and nano materials for potential applications	Apply

Mapping with Programme Outcomes

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3	2	2			3	3		2		2	2		
CO2	3	3	2	2			3	3		2		2	3		
CO3	3	3	2	2			3	3		2		2	2		
CO4	3	3	2	2			3	3		2		2	2		
CO5	3	3	2	2			3	3		2		2	2		
3- Strong;2-Medium;1-Some															

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tests(Marks)		End Sem Examination(Marks)
	1	2	
Remember	10	10	30
Understand	20	20	30
Apply	30	30	30
Analyse	0	0	10
Evaluate	0	0	0
Create	0	0	0

Syllabus

K.S.RangasamyCollege ofTechnology–AutonomousR2022							
60 PH 002- PHYSICS FOR CIVIL ENGINEERING							
Civil Engineering							
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks	
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

CRYSTAL STRUCTURE OF SOLIDS*

Lattice - Unit cell – crystal systems and Bravais lattice - Miller indices - d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing factor for HCP structure - Crystal growth techniques - solution (Slow solvent evaporation and slow cooling) - melt [9]

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(Bridgman and Czochralski) - Imperfections in crystals	
PROPERTIES OF MATTER** Stress - Strain - Hooke's law - Elastic Behavior of Material - Types of elastic moduli - Young's modulus - Bulk modulus - Rigidity modulus - Non-uniform bending - Uniform bending - Application - I- shaped girders. Torsional Pendulum - Couple per unit twist of a wire - Time period - Application - Determination of Rigidity Modulus	[9]
LASER TECHNOLOGY* Theory of laser - characteristics - Einstein's coefficients - population inversion - Types of lasers -Gas lasers (CO_2), solid-state lasers (Nd: YAG), Semiconductor laser (Homojunction and Hetero junction)- Properties of laser beams-applications - Laser scanning technology in civil engineering – LIDAR	[8]
TECHNICAL ACOUSTICS AND LIGHTING DESIGNS* Acoustics of buildings – Reverberation- Weber Fechner law- Factors affecting acoustics of a building and remedies –. Ultrasonic waves - Properties - Application of ultrasonic testing to steel-concrete composite structures– Nondestructive testing (NDT): Pulse echo system, through transmission, resonance system. LIGHTING DESIGNS: Visual field glare, colour- day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.	[10]
ADVANCED MATERIALS AND NANOTECHNOLOGY* Advanced Materials: Metallic glasses – preparation, properties and applications - Shape memory alloys (SMA) - characteristics, properties of NiTi alloy applications. Nanomaterials: Properties- Top- down process: Ball Milling method – Bottom-up process: Vapor phase deposition- Carbon Nano Tube (CNT): Properties, preparation by electric arc method, Applications of carbon nanotube: Mechanical reinforcement & Sensors.	[9]
TotalHours	**45**

Text Books:	
1.	M. N. Avadhanulu, P. G. Kshirsagar, TVS Arun Murthy "A Text Book of Engineering Physics", S Chand Publications, New Delhi, 2022.
2.	H. K. Malik, A. K. Singh "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2021
3	D. R. Joshi "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2010
Reference(s):	
1.	S.O. Pillai "A Textbook Of Engineering Physics" New Age International (P) Limited, New Delhi, 2014
2.	B. B. Laud " Lasers and Non-Linear Optics" New Age International Publications, New Delhi, 2015
3.	Palanisamy, P.K., "Physics of Materials", Scitech Publications, Chennai. 2012

*** SDG:4- Quality Education**

Course Contents and Lecture Schedule

S. No.	Topic	No. of hours
1.0	**CRYSTAL STRUCTURE OF SOLIDS**	
1.1	Lattice - Unit cell	1
1.2	Crystal systems and Bravais lattice	1
1.3	Miller indices - d spacing in cubiclattice	1
1.4	Calculation of number of atoms per unit cell - Atomic radius - Coordination number	1

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1.5	Packing factor for HCP structure	1
1.6	Crystal growth techniques	1
1.7	Solution (Slow solvent evaporation and slow cooling)	1
1.8	Melt (Bridgman and Czochralski)	
1.9	Imperfections in crystals	
2.0	**PROPERTIES OF MATTER**	
2.1	Stress - Strain - Hooke's law	1
2.2	Elastic Behavior of Material	1
2.3	Types of elastic moduli - Young's modulus - Bulk modulus - Rigidity modulus	1
2.4	Non-uniform bending	1
2.5	Uniform bending	1
2.6	Application - I- shaped girders.	1
2.7	Torsional Pendulum - Couple per unit twist of a wire	1
2.8	Time period – Application	1
2.9	Determination of Rigidity Modulus.	1
3.0	**LASER TECHNOLOGY**	
3.1	Theory of laser	1
3.2	Characteristics - Einstein's coefficients	1
3.3	Population inversion - Types of lasers	1
3.4	Gas lasers (CO_2)	1
3.5	Solid-state lasers (Nd: YAG)	1
3.6	Semiconductor laser (Homojunction and Hetero junction)	1
3.7	Properties of laser beams-applications	1
3.8	Laser scanning technology in civil engineering – LIDAR	1
4.0	**TECHNICAL ACOUSTICS AND LIGHTING DESIGNS**	
4.1	Acoustics of buildings – Reverberation- Weber Fechner law	1
4.2	Factors affecting acoustics of a building and remedies	1
4.3	Ultrasonic waves - Properties - Application of ultrasonic testing to steel-concrete composite structures	2
4.4	Nondestructive testing (NDT): Pulse echo system, through transmission, resonance system.	1
4.5	**LIGHTING DESIGNS:** Visual field glare, colour- day light calculations	1
4.6	Day light design of windows, measurement of day	1
4.7	Light and use of models and artificial skies	1
4.8	Principles of artificial lighting	1
4.9	Supplementary artificial lighting	1
5.0	**ADVANCED MATERIALS AND NANOTECHNOLOGY**	
5.1	Metallic glasses – preparation, properties and applications	1
5.2	Shape memory alloys (SMA) – characteristics	1
5.3	Properties of NiTi alloy applications	1
5.4	Nanomaterials: Properties	1

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5.5	Top- down process: Ball Milling method	1
5.6	Bottom-up process: Vapor phase deposition	2
5.7	Carbon Nano Tube (CNT): Properties, preparation by electric arc method	1
5.8	Applications of carbon nanotube: Mechanical reinforcement & Sensors.	1

Course Designers:

Dr. V. Vasudevan
Mr.S. Vanchinathan
Dr. M. Malarvizhi

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60 CH 002	CHEMISTRY FOR CIVIL ENGINEERING (B.E. CIVIL ENGINEERING)

Category	L	T	P	Credit
BS	3	0	0	3

Objective(s)

- To help the learners, analyze the hardness of water and its removal.
- To endow an overview of types of corrosion and its control.
- To rationalize the plating techniques and alloys.
- To analyze the concepts, functions and classification of composites
- To recall the basics building material.

Prerequisite

Nil

Course Outcomes

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

CO1	Identify the types of hardness of water and its removal.	Understand, Apply & Analyse
CO2	Understand the concept of corrosion and its control	Understand & Apply
CO3	Recognize the types of coating, alloys and its uses.	Understand & Apply
CO4	Understand the industrial importance of construction materials.	Apply & Analyse
CO5	Analyze the role of building materials in the various fields.	Understand & Analyse

Mapping with Programme Outcomes

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	2	3	2			2					2	3		
CO2	3	3	3	3			2	1				2	3	2	
CO3	3	3	3	2			2	2				2	2		
CO4	3	3	3	2			2					3		2	
CO5	3	3	3	2			2					3	2	3	
3- Strong;2-Medium;1-Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests		Terminal Examination
	1	2	
Remember	10	10	20
Understand	20	20	40
Apply	20	20	20
Analyze	10	10	20
Evaluate	-	-	-
Create	-	-	-

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Syllabus

K.S.Rangasamy College of Technology– Autonomous R2022								
60 CH 002- CHEMISTRY FOR CIVIL ENGINEERING								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

***WATER TECHNOLOGY** Introduction – Commercial and industrial uses of water - hardness - types – estimation of hardness by EDTA method- Internal conditioning (colloidal, phosphate, calgon and carbonate conditioning methods) – external conditioning (Zeolite process, demineralization process) - Desalination methods (Reverse Osmosis and Electro dialysis). Flash evaporation.	[7]
***CORROSION CHEMISTRY** Electrochemical corrosion, Corrosion due to dissimilar metal cells (galvanic cells), Corrosion due to differential aeration – Factors influencing corrosion- Microbial induced concrete corrosion and bio fouling -Corrosion control: cathodic protection (sacrificial anodic protection, impressed current cathodic protection).	[9]
****PROTECTIVE COATINGS** **Protective coatings:** Classification - Metallic coating: Electroplating – electroless plating - diffusion coating. Paint: types and Characteristics of paints - Constituents - Drying process. Varnishes: characteristics - Constituents. Enamels and lacquers (natural resins). **Alloys:** properties of alloys-significance of alloying, functions and effect of alloying elements - ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.	[9]
*****CONSTRUCTION MATERIALS** **Classification of Construction Materials - Soil:** Constituent of soil (phase, structure and texture)-physical and chemical properties acid, alkali and saline soils- **Clay:** Classification of clay - Composition, Particle shape, Size, Plasticity, CEC, Occurrences, Important properties and uses of China Clay, Bentonites. **Refractories:** Definition classification properties of refractories preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks. **Cement:** manufacture of Portland cement and setting.	[9]
MODERN BUILDING MATERIALS **Composites**: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites, Nano Composites: properties - applications. Hybrid composites: properties - applications.	[10]
TotalHours	**45**

Text Books:

1.	O.G. Palanna “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2017.
2.	P.C. Jain and Monica Jain, A Textbook of Engineering Chemistry, DhanpatRaipublications, New Delhi, 16th edition, 2015.

Reference(s):

1.	Jain. P.C. and Monica Jain, “Engineering Chemistry”, Dhanpatrai publishing co. New Delhi, 14th edition, 2015.
2.	Dara. S.S, “A Text Book of Engineering Chemistry”, S Chand & co. Ltd., 2014.
3.	O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
4.	Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2nd Edition, 2019.
5.	Shaw D.J., Introduction to Colloid and Surface Chemistry, Butterworth-heinemann publishers, 1992.

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*** SDG 6 – Improve Clean Water and Sanitation**

****SDG 9– Industry Innovation and Infrastructure**

*****SDG 8 – Decent Work and Economic Growth**

Course Contents and Lecture Schedule

S. No.	Topic	No. of hours
1.0	**Water Technology**	
1.1	Introduction – Commercial and Industrial uses of water	1
1.2	Hardness - types	1
1.3	Estimation of Hardness of ater by EDTA method	1
1.4	Internal conditioning (Colloidal, Phosphate, Calgon and Carbonate)	1
1.5	External conditioning (Zoelite process & Demineralization process)	1
1.6	Desalination methods (Reverse Osmosis and Electrodialysis)	1
1.7	Flash Evaporation	1
2.0	**CORROSION CHEMISTRY**	
2.1	Electrochemical corrosion	1
2.2	Corrosion due to dissimilar metal cells (galvanic cells),	1
2.3	Corrosion due to differential aeration	1
2.4	Factors influencing corrosion	2
2.5	Microbial induced concrete corrosion and bio fouling	2
2.6	Corrosion control: cathodic protection (sacrificial anodic protection, impressed current cathodic protection).	2
3.0	**PROTECTIVE COATINGS**	
3.1	**Protective coatings:** Classification.	1
3.2	Metallic coating: Electroplating – electroless plating- diffusion coating	1
3.3	Paint: types and Characteristics of paints.	1
3.4	Constituents - Drying process.	1
3.5	Varnishes: characteristics - Constituents. Enamels and lacquers (natural resins).	1
3.6	**Alloys:** properties of alloys- significance of alloying.	1
3.7	Functions and effect of alloying elements - ferrous alloys – nichrome and stainless steel.	2
3.8	Heat treatment of steel, non-ferrous alloys – brass and bronze.	1
4.0	**CONSTRUCTION MATERIALS**	
4.1	**Classification of Construction Materials - Soil:** Constituent of soil (phase, structure and texture)	1
4.2	physical and chemical properties acid, alkali and saline soils	1
4.3	**Clay:** Classification of clay - Composition, Particle shape, Size, Plasticity, CEC, Occurrences.	1
4.4	Important properties and uses of China Clay, Bentonites.	1

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4.5	**Refractories:** Definition classification properties of refractories.	1
4.6	Preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks.	2
4.7	**Cement:** manufacture of Portland cement and setting.	2
5.0	**MODERN BUILDING MATERIALS**	
5.1	**Composites**: Introduction: Definition & Need for composites;	1
5.2	Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix)	2
5.3	Reinforcement (fiber, particulates, flakes and whiskers).	1
5.4	Properties and applications of Metal matrix composites (MMC)	1
5.5	Ceramic matrix composites and Polymer matrix composites	1
5.6	Nano Composites: properties - applications.	2
5.7	Hybrid composites: properties - applications.	2

Course Designers

Dr.T.A.SUKANTHA
Dr.B.SRIVIDHYA
Dr.K.PRABHA
Dr.S.MEENACHI
Mr.K.TAMILARASU
Ms.D.KIRTHIGA

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60 EE 001	Basic Electrical and Electronics Engineering	Category	L	T	P	Credit
		ES	3	0	0	3

Objective

- To familiarize the basic concept on electrical circuits and its various parameters
- To facilitate the various types of electrical machines and their uses
- To gain knowledge on Electrical safety
- To provide exposure on the functions of various semiconductor devices
- To familiarize the use of various measuring instruments

Prerequisite

NIL

Course Outcomes

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

CO1	Apply the basic laws of electric circuits to calculate the unknown quantities.	Remember, Understand and Apply
CO2	Acquire knowledge on different electrical machines and select suitable machines for industrial applications.	Remember, Understand and Analyze
CO3	Recognize the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Remember, Understand
CO4	Realize the operation and characteristics of semiconductor devices.	Remember, Understand and Analyze
CO5	Understand the operating principles of measuring instruments and choose suital instrument for measuring the parameters.	Remember, Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	2	-	-	-	-	2	3	-	3	2
CO2	3	3	1	1	-	-	2	-	2	-	2	1	3	2
CO3	3	3	-	2	-	2	-	-	-	-	2	2	3	2
CO4	2	2	3	-	2	-	2	1	-	2	1	3	3	2
CO5	2	3	1	2	-	-	3	2	-	-	2	3	3	2
3- Strong;2-Medium;1-Some														

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests(Marks)			End Sem Examination(Marks)
	1	**2**	3	
Remember	10	20	20	30
Understand	20	30	30	30
Apply	30	10	10	30
Analyse	0	0	0	10
Evaluate	0	0	0	0
Create	0	0	0	0

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 EE 001 - Basic Electrical and Electronics Engineering								
Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

ELECTRICAL CIRCUITS DC Circuits: Circuit Components: Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws–Simple problems. Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform real power, reactive power and apparent power, power factor – Steady state analysis of RLC series circuits- Simple problems. Introduction to three phase AC circuits	[10]
ELECTRICAL MACHINES* Construction and Working principle - Separately and Self excited DC Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.	[10]
ELECTRICAL INSTALLATIONS* Domestic wiring, types of wires and cables, earthing,protective devices- switch fuse unit- Miniature Circuit Breaker-Moulded Case Circuit Breaker- Earth Leakage Circuit Breaker, Batteries and types, UPS,Safety precautions and First Aid.	[9]
ANALOG ELECTRONICS Introduction to Semiconductor Materials– PN Junction Diodes, Zener Diode –Characteristics and Applications – Bipolar Junction Transistor-Biasing and Configuration (NPN) - **Regulated power supply unit***, **switched mode power supply***	[8]
MEASUREMENTS AND INSTRUMENTATION Functional elements of an instrument, Standards and calibration, Operating Principle, types -Moving Coil and Moving Iron meters, Operating principles and Types of Wattmeter, Energy Meter, Instrument Transformers-**CT and PT, DSO***- Block diagram- **Data acquisition***	[8]
TotalHours	45

TextBook(s):

1.	Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2	A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

Reference(s):

1.	Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2.	Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
3.	Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
4.	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

***SDG 9 – Industry Innovation and Infrastructure**

R2/ w.e.f. 03.01.2024
Passed in the BOS Meeting Held on 21.11.2023
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BOS Chairman

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**ELECTRICAL CIRCUITS**	
1.1	Circuit Components: Resistor, Inductor, Capacitor	1
1.2	Ohm's Law - Kirchhoff's Laws	1
1.3	Ohm's Law - Kirchhoff's Laws - Problems	2
1.4	Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform	2
1.5	Real power, reactive power and apparent power, power factor	1
1.6	Steady state analysis of RLC series circuits	1
1.7	RLC series circuits - Problems	1
1.8	Introduction to three phase system	1
2	**ELECTRICAL MACHINES**	
2.1	Construction and Working principle of DC Generator	1
2.2	Types and Applications of Separately and Self excited DC Generators	1
2.3	EMF equation of DC Generator	1
2.4	Working Principle of DC motors	1
2.5	Torque Equation	1
2.6	Types and Applications	1
2.7	Construction, Working principle and Applications of Transformer	1
2.8	Construction, Working principle and Applications of Three phase Alternator	1
2.9	Construction, Working principle and Applications of Synchronous motor	1
2.10	Construction, Working principle and Applications of Three Phase Induction Motor	1
3	**ELECTRICAL INSTALLATIONS**	
3.1	Domestic wiring, types of wires and cables	1
3.2	Earthing, protective devices	2
3.3	Switch fuse unit- Miniature Circuit Breaker	1
3.4	Molded Case Circuit Breaker- Earth Leakage Circuit Breaker	1
3.5	Batteries and types	2
3.6	UPS	1
3.7	Safety precautions and First Aid	1
4	**ANALOG ELECTRONICS**	
4.1	Introduction to Semiconductor Materials	1
4.2	Characteristics and Applications of PN Junction Diodes	1
4.3	Characteristics and Applications of Zener Diode	1
4.4	Bipolar Junction Transistor	1

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4.5	Biasing & Configuration (NPN)	2
4.6	Regulated power supply unit	1
4.7	Switched mode power supply	1
5	**MEASUREMENTS AND INSTRUMENTATION**	
5.1	Functional elements of an instrument	1
5.2	Standards and calibration	1
5.3	Moving Coil meters - Operating Principle, types	1
5.4	Moving Iron meters - Operating Principle, types	1
5.5	Operating principles and Types of Wattmeter	1
5.6	Energy Meter	1
5.7	Instrument Transformers – CT& PT	1
5.9	DSO- Block diagram- Data acquisition	1
	Total	45

Course Designers

1. Mr.S.Srinivasan - srinivasan@ksrct.ac.in
2. Ms.R.Radhamani -radhamani@ksrct.ac.in
3. Ms.S.Jaividhya - jaividhya@ksrct.ac.in
4. Dr.S.Gomathi - gomathi@ksrct.ac.in
5. Mr.T.Prabhu - prabhut@ksrct.ac.in

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60 GE 001	Heritage of Tamils (Common to all Branches)	Category	L	T	P	Credit
		GE	1	0	0	1

Objectives

- To learn the extensive literature of classical Tamil.
- To review the fine arts heritage of Tamil culture.
- To realize the contribution of Tamils in Indian freedom struggle.

Pre-requisite

-Nil-

Course Outcomes

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

CO1	Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3	Review on folk and martial arts of Tamil people.	Understand
CO4	Insightthinai concepts, trade and victory of Chozha dynasty.	Understand
CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1							3	3		2		3
CO 2							3	3		2		3
CO 3							3	3		2		3
CO 4							3	3		2		3
CO 5							3	3		2		3
3- Strong; 2-Medium; 1-Some2												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests		Model Examination
	1	2	
Remember	10	10	20
Understand	20	20	40
Apply	20	20	20
Analyze	10	10	20
Evaluate	-	-	-
Create	-	-	-

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Syllabus

K.S.RangasamyCollegeofTechnology–AutonomousR2022								
60 GE 001- Heritage of Tamils								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Tota
I	1	0	0	15	1	100	-	

Language and Literature* Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.	[3]
Heritage - Rock Art Paintings to Modern Art – Sculpture* Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.	[3]
Folk and Martial Arts* Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	[3]
Thinai Concept of Tamils* Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.	[3]
Contribution of Tamils to Indian National Movement and Indian Culture* Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.	[3]
TotalHours	15

TextBook(s):

1.	தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு).
4.	பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and

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	Educational Services Corporation, Tamil Nadu).
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

***SDG:4- Quality Education**

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60 GE 001	தமிழர் மரபு (அனைத்து துறைகளுக்கும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1

பாடத்தின் நோக்கங்கள்:

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல்.
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை.
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்

முன்கூட்டியதுறைசார்அறிவு

தேவைஇல்லை

பாடம்கற்றதின்விளைவுகள்

பாடத்தைவெற்றிகரமாகக்கற்றுமுடித்த பின்பு, மாணவர்களால் முடியும்விளைவுகள்

CO1	தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்த தெரிதல்.	புரிதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்ததெளிவு.	புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு.	புரிதல்
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதையை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல்.	புரிதல்

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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Syllabus

K.S.RangasamyCollegeofTechnology–AutonomousR2022								
60 GE 001- தமிழர்மரபு								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1	100	-	100

மொழி மற்றும் இலக்கியம்: * இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள் - தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.	[3]
மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை-சிற்பக் கலை: * நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.	[3]
நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: * தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.	[3]
தமிழர்களின் திணைக் கோட்பாடுகள்: * தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.	[3]
இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: * இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.	[3]
TotalHours	15

TextBook(s):

1.	தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு).

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4.	பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

***SDG:4- Quality Education**

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TIRUCHENGODE - 637 215

60 CP 0P1	PHYSICS AND CHEMISTRY LABORATORY (CIVIL, MECH & MCT)

Category	L	T	P	Credit
BS	0	0	4	2

Objective(s)

1. To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
3. To analyze the behavior and characteristics of various materials for its optimum utilization
4. Test the knowledge of theoretical concepts and develop the experimental skills of the learners.
5. To facilitate data interpretation and expose the learners to various industrial and environmental applications

Prerequisite

Nil

Course Outcomes

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

CO1	Apply the concept of stress, strain and elastic limit for a given sample to find their properties	Apply
CO2	Recognize the concept of quantum Physics & magnetic properties by experimental verification	Apply
CO3	Recall the knowledge of properties of light and fiber optic cable	Apply
CO4	Apply the concepts of chemistry and develop analytical skills for applications in engineering to determine the rate of corrosion	Apply
CO5	Analyze the pH, electrode potential, conductance sample solutions	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3		3				3	3	2	2	2	2	
CO2	3	3		3				3	3	2	2	2	2	
CO3	3	3		3				3	3	2	2	2	2	
CO4	3	2	3	2			2				2	2	3	3
CO5	3	2	2	2			2						2	2
3- Strong; 2-Medium; 2-Low														

PHYSICS LABORATORY
(B.E CIVIL, MECH & MCT)

List of Experiments

1. Determination of Young's modulus of a given material - Uniform bending
2. Determination of rigidity modulus of a wire - Torsional pendulum.
3. Determination of Planck's constant.
4. Magnetic field along the axis of current carrying coil – Stewart and Gee.
5. (a) Laser- Determination of the wave length of the laser using grating.
   (b) Optical fibre -Determination of Numerical Aperture and acceptance angle.

Course Designers

Dr. V.Vasudevan
Mr.S. Vanchinathan
Dr. M.Malarvizhi

*** SDG: 4- Quality Education**

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CHEMISTRY LABORATORY
(B.E CIVIL, MECH & MCT)

List of Experiments

1. Estimation of hardness of water sample by complexometric method.
2. Determination of Dissolved Oxygen in water sample by Winkler's method
3. Determination of corrosion by weight loss method
4. Estimation of HCl by pH meter.
5. Estimation of mixture of acids by conductivity meter.

Case studies/Activity report

1. Case study on Dissolved Oxygen in various water samples.
2. Activity report for determination of HCl using conductometric titration

Course Designers

Dr.T.A.SUKANTHA
Dr.B.SRIVIDHYA
Dr.K.PRABHA
Dr.S.MEENACHI

***SDG 6: Improve Clean Water and Sanitation**
***SDG 9: Industry, Innovation, and Infrastructure**
***SDG 8: Decent Work and Economic Growth**

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60 EE 0P1	**Basic Electrical and Electronics Engineering Laboratory** **(Common to Civil, Mech, MCT and FT Branches)**	**Category**	**L**	**T**	**P**	**Credit**
		BS	**0**	**0**	**4**	**2**

Objectives

- To acquire knowledge in conducting basic electrical laws
- To gain knowledge on three phase power measurement
- To train the students in conducting load tests on electrical machines
- To gain practical experience in characterizing electronic devices
- To gain practical experience in using measuring devices

Course Outcomes

CO1	Practice experimental methods to verify the Ohm's and Kirchhoff's Laws.	Apply
CO2	Calculate the three-phase power measurement	Apply
CO3	Analyze experimentally the load characteristics of electrical machines.	Analyze
CO4	Analyze the characteristics of basic electronic devices.	Analyze
CO5	Calibrate the measuring devices	Analyze

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	2			2		3	3	3	2
CO2	3	3	3	3	2	2		3			3	3	3	2
CO3	3	3	3	3	2	2			2		3	3	3	2
CO4	3	3	3	3	2	2	2	2		2	3	3	3	2
CO5	3	3	3	3	2	2	2				3	3	3	2
3- Strong;2-Medium;1-Some														

List of Experiments

1. Verification of Ohm's and Kirchhoff's Laws.
2. Measurement of Three Phase Power.
3. Load test on DC Shunt Motor.
4. Load test on Self Excited DC Generator.
5. Load test on Single phase Transformer.
6. Load test on Induction Motor.
7. Characteristics of PN and Zener Diodes.
8. Characteristics of BJT (CE).
9. Calibration of Single-Phase Energy Meter*
10. Mini Project*

Course Designers

1. Mr.S.Srinivasan - srinivasan@ksrct.ac.in
2. Ms.R.Radhamani - radhamani@ksrct.ac.in
3. Ms.S.Jaividhya - jaividhya@ksrct.ac.in
4. Dr.S.Gomathi - gomathi@ksrct.ac.in
5. Mr.T.Prabhu - prabhut@ksrct.ac.in

***SDG 9 – Industry Innovation and Infrastructure**

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

SECOND SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 EN 002	Professional English II	2	40	60	100	45	100
2	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	2	40	60	100	45	100
3	60 CS 001	C Programming	2	40	60	100	45	100
4	60 CE 101	Engineering Drawing for Civil Engineers	2	50	50	100	45	100
5	61 CE 201	Applied Mechanics	2	40	60	100	45	100
6	60 MY 001	Environmental Studies and Climate Change	2	100	-	100	-	-
7	60 GE 002	Tamils and Technology(தமிழரும் தொழில்நுட்பமும்)	2	100	-	100	-	-
PRACTICAL								
8	60 CS 0P1	C Programming Laboratory	3	60	40	100	45	100
9	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	3	60	40	100	45	100
10	60 CG 0P1	Career Skill Development - I	3	100	-	100	-	-

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 EN 002	Professional English II	Category	L	T	P	Credit
		HS	1	1	0	2

Objective

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisite

Basic knowledge of reading and writing in English and should have completed Professional English I.

Course Outcomes

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

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1								2	3	3	2	3	2	3
CO 2								2	3	3	2	3	3	3
CO 3								2	3	3	2	3	2	3
CO 4								2	3	3	2	3	3	3
CO 5								2	3	3	2	3	2	3
3- Strong;2-Medium;1-Some														

AssessmentPattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	10
Apply (Ap)	20	20	40
Analyse (An)	30	30	50
Create (Cr)	0	0	0

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Syllabus

K.S.RangasamyCollege ofTechnology–AutonomousR2022								
60 EN 002 Professional English II								
Common to All Branches								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	1	1	0	30	2	40	60	100

Making Comparisons* **Listening:** Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) **Speaking:** Marketing a product, persuasive speech techniques. **Reading:** Reading advertisements, user manuals and brochures. **Writing:** Professional emails, Email etiquette - compare and contrast essay. **Language Focus:** mixed tenses, prepositional phrases, same words used in different contexts and discourse markers	**[3]**
Expressing Causal Relations in Speaking and Writing* **Listening:** Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects. **Speaking:** Describing and discussing the reasons of accidents or disasters based on news reports. **Reading:** longer technical texts– cause and effect essays, and letters / emails of complaint, **Writing:** Writing responses to complaints **Language Focus:** Active Passive Voice transformations, Infinitive and Gerunds – Word Formation (Noun-Verb-Adj-Adv), Adverbs.	**[3]**
Problem Solving* **Listening:** Listening to / watching movie scenes/ documentaries depicting a technical problem and suggesting solutions. **Speaking:** Group Discussion (based on case studies), - techniques and Strategies. **Reading:** Case Studies, excerpts from literary texts, news reports etc. **Writing:** Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay **Language Focus:** Error correction; If conditional sentences - Compound Words, Sentence Completion.	**[3]**
Reporting of Events and Research* **Listening:** Listening Comprehension based on new report and documentaries – **Speaking:** Interviewing, presenting oral reports, Mini presentations on select topics. **Reading:** Newspaper articles. **Writing:** Recommendations, Transcoding, Accident Report, Precis writing and Summarising **Language Focus:** Reported Speech – Modals - Conjunctions- use of Prepositions	**[3]**
The Ability to put Ideas or Information Coherently* **Listening:** Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance). **Speaking:** Participating in role plays, virtual interviews, making presentations with visual aids **Reading:** excerpts of interview with professionals **Writing:** Job / Internship application – Cover letter & Résumé **Language Focus:** Numerical Adjectives, question types: Wh/ Yes or No/ and Tags; Relative Clauses - Idioms.	**[3]**
	Total Hours: 15 + 15(Tutorial) : 30 hours

Textbook(s):	
1.	'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior

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	Vocabulary Book', Penguin Random House India, 2020
Reference(s):	
1.	Raman. Meenakshi, Sharma. Sangeeta, 'Professional English'. Oxford university press. New Delhi. 2019
2.	Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003
3.	Prof. R.C. Sharma & Krishna Mohan, *'Business Correspondence and Report Writing'*, Tata McGraw Hill & Co. Ltd., New Delhi, 2001
4.	V.N. Arora and Laxmi Chandra, *'Improve Your Writing'*, Oxford University Press, New Delhi, 2001

*** SDG- 04- Quality Education**

Course Contents and Lecture Schedule

S.No	Topic	No.ofHours
1.	**Making Comparisons**	
1.1	Evaluative Listening	1
1.2	Product Descriptions and filling a graphic organiser	1
1.3	Marketing a product by using persuasive techniques	2
1.4	Reading advertisements, user manuals and brochures	1
1.5	Writing professional emails	1
1.6	Compare and contrast essay	1
1.7	mixed tenses and prepositional phrases	1
1.8	Same words used in different contexts	1
2	**Expressing Causal Relations in Speaking and Writing**	
2.1	Listening to longer technical talks	1
2.2	Listening to process/event descriptions	1
2.3	Describing and discussing the reasons of accidents or disasters	1
2.4	Reading longer technical texts– cause and effect essays	1
2.5	Writing responses to complaints	1
2.6	Active Passive Voice transformations	2
2.7	Infinitive and Gerunds	1
2.8	Word Formation (Noun-Verb-Adj-Adv), Adverbs.	1
3	**Problem Solving**	
3.1	Listening to documentaries and suggesting solutions	1
3.2	Group Discussion (based on case studies)	2
3.3	Reading Case Studies, excerpts from literary texts and news reports	1
3.4	Letter to the Editor	1
3.5	Checklists	1

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3.6	Problem solution and argumentative essays	1
3.7	Error correction and Sentence Completion	1
3.8	If conditional sentences	1
4	**Reporting of Events and Research**	
4.1	Listening Comprehension	1
4.2	Interviewing and presenting oral reports	1
4.3	Mini presentations on select topics	1
4.4	Reading newspaper articles	1
4.5	Recommendations	1
4.6	Transcoding	1
4.7	Precis writing and Summarising	1
4.8	Reported Speech, Modals	1
4.9	Conjunctions	
5	**The Ability to put Ideas or Information Coherently**	
5.1	Listening to Formal job interviews	1
5.2	Role plays	2
5.3	Virtual interviews	1
5.4	Reading Company profiles	1
5.5	Writing Statement of Purpose (SoPs)	1
5.6	Writing Résumé	1
5.7	Numerical Adjectives and Relative Clauses - Idioms	1
5.8	question types: Wh/ Yes or No/ and Tags	1
	Total	**45**

Course Designers

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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TIRUCHENGODE - 637 215

60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To provide exposure in handling the situations involving multiple integrals
- To familiarize the basic concepts in Vector calculus.
- To get exposed to the fundamentals ofanalytic functions.
- Todevelop the mathematical skills in solving partial differential equations.
- To facilitate the concepts in Laplace transform techniques.

Pre-requisite

NIL

Course Outcomes

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

CO1	Evaluate double and triple integrals.	Remember,Apply, Evaluate
CO2	Analyze the basic concepts of vector calculus.	Remember,Analyze, Evaluate
CO3	Construct the analytic functions and evaluate complex integrals.	Remember, Understand, Apply
CO4	Compute the solution of partial differential equations using different methods.	Remember, Apply
CO5	Apply Laplace transform techniques for solving differential equations.	Remember,Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3							2	3	2
CO2	3	3	2	2	3							2	3	2
CO3	3	3	3	2	2							2	3	2
CO4	3	3	3	3	2							2	3	2
CO5	3	3	2	3	3							2	3	2

3- Strong;2-Medium;1-Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Exam (Marks)	End Sem Examination (Marks)
	1	2		
Remember (Re)	10	10	10	10
Understand (Un)	0	10	10	10
Apply (Ap)	20	40	40	40
Analyze (An)	10	0	20	20
Evaluate (Ev)	20	0	20	20
Create (Cr)	0	0	0	0
Total	60	60	100	100

Syllabus

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K.S. Rangasamy College of Technology – Autonomous (R 2022)								
60 MA 003 - Integrals , Partial Differential Equations and Laplace Transform								
Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

MULTIPLE INTEGRALS Double integration – Cartesian and polar co-ordinates – Change of order of integration – Area as double integral – Triple integration in Cartesian co-ordinates – Change of variables - Cartesian to polar co-ordinates and Cartesian to Cylindrical co-ordinates.	[9]
VECTOR CALCULUS* Introduction - Gradient of a scalar point function –Directional derivative – Angle of intersection of two surfaces – Divergence and curl (excluding vector identities) – Solenoidal and irrotational vectors – Application: Green's theorem in the plane – Gauss divergence theorem -Stokes' theorem (statement only) .	[9]
ANALYTIC FUNCTIONS AND INTEGRALS Analytic function – Necessary and Sufficient conditions (statement only)-Properties – Harmonic function – Construction of an analytic function – Cauchy's Integral theorem (statement only) – Cauchy's integral formula – Classification of singularities – Application: Cauchy's residue theorem.	[9]
PARTIAL DIFFERENTIAL EQUATIONS Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Non-Linear partial differential equations of first order – Lagrange's linear equations – Application: Homogeneous Linear partial differential equations with constant coefficients.	[9]
LAPLACE TRANSFORM Conditions for existence – Transforms of elementary functions – Basic properties - Derivatives and integrals of transforms - Initial and final value theorem – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (excluding proof) – Application: Solution of second order ordinary differential equations with constant co-efficients.	[9]
Total Hours: 45 + 15(Tutorial)	**60**

TextBook(s):

1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.

Reference(s):

1.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.
2.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand & Company Ltd, New Delhi, 2017
3.	Bali N P and Manish Goyal, "A text book of Engineering Mathematics",10th Edition, Laxmi Publications (P) Ltd, 2016.
4.	Dr.P.N.Agrawal, Dr.D.N.Pandey ,"Integral Equations, Calculus of Variations and its Applications", NPTEL online video courses.

***SDG:4 Quality Education**

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CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**MULTIPLE INTEGRALS**	
1.1	Double integration	1
1.2	Cartesian and polar coordinates	1
1.3	Change of order of integration	1
1.4	Area as double integral	1
1.5	Tutorial	2
1.6	Triple integration in Cartesian coordinates	1
1.7	Change of variables	1
1.8	Cartesian to polar coordinates	1
1.9	Cartesian to Cylindrical coordinates	1
1.10	Tutorial	2
2	**VECTOR CALCULUS**	
2.1	Introduction: Gradient of a scalar point function	1
2.2	Directional derivative	1
2.3	Angle of intersection of two surfaces	1
2.4	Divergence and curl (excluding vector identities)	1
2.5	Tutorial	2
2.6	Solenoidal and irrotational vectors	1
2.7	Application: Green's theorem in the plane	1
2.8	Gauss divergence theorem	1
2.9	Stokes' theorem (statement only)	1
2.10	Tutorial	2
3	**ANALYTIC FUNCTIONS AND INTEGRALS**	
3.1	Analytic function	1
3.2	Necessary and Sufficient conditions (statement only)	1
3.3	Properties	1
3.4	Harmonic function	1
3.5	Tutorial	2
3.6	Construction of an analytic function	1
3.7	Cauchy's Integral theorem (statement only), Cauchy's integral formula	1
3.8	Classification of singularities	1
3.9	Applications : Cauchy's residue theorem.	1
3.10	Tutorial	2
4	**PARTIAL DIFFERENTIAL EQUATIONS**	
4.1	Formation of partial differential equations by eliminating arbitrary constants	1

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4.2	Formation of partial differential equations by eliminating arbitrary functions	2
4.3	Tutorial	2
4.4	Non- linear partial differential equations of first order	2
4.5	Lagrange's linear equations	1
4.6	Application : Homogeneous Linear partial differential equations with constant coefficients.	2
4.7	Tutorial	2
5	**LAPLACE TRANSFORM**	
5.1	Conditions for existence	1
5.2	Transforms of elementary functions	1
5.3	Basic properties	1
5.5	Derivatives and integrals of transforms, Initial and final value theorem	1
5.6	Tutorial	1
5.7	Transform of periodic functions	2
5.8	Inverse Laplace transform	1
5.9	Convolution theorem (excluding proof)	1
5.10	Application:Solution of second order ordinary differential equation with constant co-efficient.	1
5.11	Tutorial	2
	Total	**60**

CourseDesigners

1. Dr. C. Chandran cchandran@ksrct.ac.in
2. Dr. K. Prabakaran prabakaran@ksrct.ac.in

***SDG:4 Quality Education**

List of MATLAB Programmes:

1. Evaluating double and triple integrals.
2. Area as double integral.
3. Volume as triple integral.
4. Plotting and visualizing single variable functions.
5. Plotting and visualizing functions of two and three variables.
6. Evaluating Gradient, divergence and curl.
7. Evaluating Laplace & Inverse Laplace transforms.
8. Applying Laplace transform techniques to solve differential equations

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60 CS 001	C PROGRAMMING	Category	L	T	P	Credit
		ES	3	0	0	3

Objective

- To learn most fundamental element of the C language and to examine the execution of branching, looping statements,
- To examine the concepts of arrays, its characteristics and types and strings.
- To understand the concept of functions, pointers and the techniques of putting them to use
- To apply the knowledge of structures and unions to solve basic problems in C language
- To enhance the knowledge in file handling functions for storage and retrieval of data

Prerequisite

NIL

Course Outcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Construct the fundamental building blocks of structured Programming in C	Apply
CO2	Implement the different operations on arrays and strings	Apply
CO3	Develop simple real world applications utilizing functions, recursion and pointers.	Apply
CO4	Demonstrate the concepts of structures ,unions ,user defined data types and preprocessor	Apply
CO5	Interpret the file concepts using proper standard library functions for a given application	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3		3				2	2		2
CO2	3	3	3		3				2	2		2
CO3	3	3	3		3				2	2		2
CO4	3	3	3		3				2	2		2
CO5	3	3	3		3				2	2		2
3- Strong;2-Medium;1-Some												

AssessmentPattern

Cognitive Levels	Continuous Assessment Tests		End Semester Examination(Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	40	40	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

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TIRUCHENGODE - 637 215

K.S.RangasamyCollegeofTechnology–Autonomous R2022								
60 CS001–C Programming								
Common to All branches								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Basics of C, I/O, Branching and Loops Structure of a C Program – Data types – Keywords - Variables – Type Qualifiers - Constants – Operators– expressions and precedence- Console I/O– Unformatted and Formatted Console I/O - Conditional Branching and Loops-Writing and evaluation of conditionals and consequent branching	[9]
Arrays and Strings Arrays: One Dimensional Arrays - Two Dimensional Arrays – Matrix Manipulation - Character arrays – Strings: String Manipulation with and without String Handling Functions.	[7]
Functions and Pointers Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes – Call by value and Call by reference – Function Categorization- Arguments to main function—Recursion and application - Passing Arrays to Functions– Storage class Specifiers. Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers– Function and pointers - Dynamic memory allocation.	[11]
Structures, Unions, Enumerations, Typedef and Preprocessors Structures - Introduction to Structures and Initialization - Arrays of Structures- Arrays and Structures, Nested Structures - Passing Structures to Functions - Structure Pointers - Unions – Bit Fields - Enumerations - typedef –The preprocessor and commands.	[9]
File Handling File: Streams –Reading and Writing Characters - Reading and Writing Strings - File System functions – File Manipulation-Sequential access - Random Access Files – Command Line arguments.	[9]
TotalHours	**45**

TextBook(s):

1.	Herbert Schildt, “The Complete Reference C”, Fourth Edition, Tata McGraw Hill Edition, 2010.
2.	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.

Reference(s):

1.	E.Balagurusamy, “Programming in ANSI C”, Seventh Edition, Tata McGraw Hill Edition, New Delhi, 2016.
2.	Brian W. Kernighan and Dennis M. Ritchie, “C Programming Language”, Prentice-Hall.
3.	ReemaThareja, “Computer Fundamentals and Programming in C”, Second Edition, Oxford Higher Education, 2016.
4.	K N King, “C Programming: A Modern Approach”, Second Edition, W.W.Norton, New York, 2008.

Course Contents and LectureSchedule

Module No.	Topic	No.of Hours
1	**Basics of C, I/O, Branching and Loops**	
1.1	Structure of a C Program, Keywords	1
1.2	Data types, Type Qualifiers	1
1.3	Variables and Constants	1
1.4	Operators–expressions and precedence	1

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1.5	Console I/O– Unformatted and Formatted Console I/O	1
1.6	Conditional Branching	1
1.7	Iteration and loops	2
1.8	Writing and evaluation of conditionals and consequent branching	1
2	**ArraysandStrings**	
2.1	One Dimensional Array	1
2.2	Two-Dimensional Array and MatrixManipulation	1
2.3	Character arrays and Strings Basics	1
2.4	String Manipulation without String Handling Functions	2
2.5	String Manipulation with String Handling Functions	2
3	**Functions and Pointers**	
3.1	Scope of a Function – Library Functions, User defined functions and Function Prototypes	1
3.2	Function Call by value and Function Call by reference,Function Categorization	2
3.3	Arguments to main function	1
3.4	Recursion and application	1
3.5	Passing Arrays to Functions	1
3.6	Storage class Specifiers	1
3.7	Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions	1
3.8	Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers	1
3.9	Function and pointers	1
3.10	Dynamic memory allocation	1
4	**Structures, Unions, Enumerations, Typedef and Preprocessors**	
4.1	Introduction to Structures and Initialization	1
4.2	Arrays and Structures, Arrays of Structures	1
4.3	Structures within Structures, Passing Structures to Functions	2
4.4	Structure Pointers	1
4.5	Unions and Bit Fields.	1
4.6	Enumerations - typedef	1
4.7	Preprocessor commands	2
5	**File Handling**	
5.1	File Streams –Reading and Writing Characters - Reading and Writing Strings	2
5.2	File System functions and File Manipulation	2
5.3	Sequential access	2
5.4	Random Access Files	2
5.5	Command Line arguments and files	1
	Total Hours	**45**

Course Designers

1. Dr.P.Kaladevi -kaladevi@ksrct.ac.in

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60 CE 101	ENGINEERING DRAWING FOR CIVIL ENGINEERS

Category	L	T	P	Credit
ES	2	0	4	4

Objective

- To introduce the students to use drawing instruments and to draw cones, polygons, Engineering curves etc.
- To introduce the students to use scales and orthographic projections, projections of points & simple lines.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To make the students to understand about Civil Engineering Components and its identification code.

Prerequisite

Basic knowledge of Higher Secondary Mathematics, Binary Operations & Mathematical Logic.

Course Outcomes

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

CO1	Use the different drafting instruments to draw the drawings.	Apply
CO2	Draw the projections of regular points and line.	Apply
CO3	Draw the projections of solids.	Apply
CO4	Identifying the building drawing symbols and observations.	Understand
CO5	Draw details of part of a building.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2	1	3				1			2
CO2	3	1	1	1	2				2			2
CO3	3	1	1	1	2				2			2
CO4	2		1		3				2			2
CO5	2		1		3				2			2

3- Strong;2-Medium;1-Some

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	10	30
Apply (Ap)	30	40	50
Analyse (An)	00	00	00
Create (Cr)	10	10	20

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
60 CE 101 - Engineering Drawing for Civil Engineers								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	2	0	4	60	4	50	50	100

Introduction to Engineering Drawing * Use of drawing instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning – Drawing sheet layouts - Title block – Line types – Scales: plain, diagonal and vernier scales.	**[12]**
Projection of lines and planes * Introduction to orthographic projections – Planes of projection – Projection of points and lines inclined to both planes – Projection of planes (Inclined to one plane and parallel to other – Inclined to both planes) - Conversions of pictorial views to orthographic views - Projections of simple solids: prism, cylinder and cone (Axis of solid inclined to both HP and VP).	**[12]**
Projection of solids * Sections of Solids: Prism, Cylinder, Cone – Auxiliary Views - Draw the sectional orthographic views of geometrical solids, objects from industry.	**[12]**
Introduction to engineering building drawing * Types of drawing with appropriate scale and directions – uses of key plan and index map, village map - sketch the conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel – water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.	**[12]**
Building components * Draw the plan and cross section of load bearing structure and framed structure - cross section of a load bearing wall and framed structure showing all the components below and above the ground level – drawings of parts of buildings such as staircase, chajjas, columns and piers – draw the elevation of various buildings.	**[12]**
Total Hours	**60**

Textbook(s):

1.	Bhatt N.D., “Engineering Drawing”, Charotar Publishing House Pvt. Ltd., 53rd Edition, Gujarat, 2014.
2.	Basant Agarwal and C.M.Agarwal., “Engineering Drawing”, McGraw Hill Education, 2013.

Reference(s):

1.	Shah M.B., Rana B.C., and V.K.Jadon., “Engineering Drawing”, Pearson Education, 2011.
2.	Natarajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2014.

*** SDG:4 Quality Education**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Introduction to Engineering Drawing**	
1.1	Use of drawing instruments	1
1.2	BIS conventions and specifications	1
1.3	Drawing sheet layouts - Title block – Line types	1
1.4	Tutorial	2
1.5	Size, layout and folding of drawing sheets	1
1.6	Size, layout and folding of drawing sheets	1
1.7	Lettering and dimensioning	1
1.8	Scales: plain, diagonal and vernier scales	1
1.9	Scales: plain, diagonal and vernier scales	1
1.10	Tutorial	2
2	**Projection of lines and planes**	
2.1	Introduction to orthographic projections – Planes of projection	1
2.2	Projection of points and lines inclined to both planes	2
2.3	Projection of planes (Inclined to one plane and parallel to other Inclined to both planes)	1
2.4	Tutorial	2
2.5	Conversions of pictorial views to orthographic views	1
2.6	Projections of simple solids: prism, cylinder and cone (Axis of solid inclined to both HP and VP).	1
2.7	Projections of simple solids: prism, cylinder and cone (Axis of solid inclined to both HP and VP).	1
2.8	Projections of simple solids: prism, cylinder and cone (Axis of solid inclined to both HP and VP).	1
2.9	Tutorial	2
3	**Projection of solids**	
3.1	Sections of Solids: Prism	1
3.2	Sections of Solids: Cylinder	1
3.3	Sections of Solids: Cone	1
3.4	Tutorial	2
3.5	Auxiliary Views	1
3.6	Draw the sectional orthographic views of geometrical solids, objects from industry.	2
3.7	Draw the sectional orthographic views of geometrical solids, objects from industry.	2
3.8	Tutorial	2
4	**Introduction to engineering building drawing**	
4.1	Types of drawing with appropriate scale and directions	1
4.2	uses of key plan and index map, village map	1

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4.3	Sketch the conventional signs for materials like bricks, stone, concrete	2
4.4	Tutorial	2
4.5	Sketch the conventional signs for materials like wood, glass, earth, steel	2
4.6	Sketch the conventional signs for materials like water supply and sanitary fixtures	1
4.7	Sketch the conventional signs for materials like water supply and sanitary fixtures	1
4.8	Tutorial	2
5	**Building components**	
5.1	Draw the plan and cross section of load bearing structure	2
5.2	Draw the plan and cross section of framed structure	2
5.3	Tutorial	2
5.4	Cross section of a load bearing wall and framed structure showing all the components below and above the ground level	2
5.5	Drawings of parts of buildings such as staircase, columns	1
5.6	Draw the elevation of various buildings.	1
5.7	Tutorial	2
	Total	**60**

Course Designers

1. Dr.S.GUNASEKAR - gunasekar@ksrct.ac.in

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61 CE 201	APPLIED MECHANICS	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To understand static equilibrium of particles and rigid bodies in two dimensions.
- To comprehend the effect of friction on equilibrium.
- To Understand the properties of section that are needed for the design of structural elements
- To understand the laws of motion, the kinematics of motion and the interrelationship.
- To impart a knowledge about properties of sections, kinetics of particles..

Prerequisite

Basic knowledge of Physics

CourseOutcomes

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

CO1	Recall the fundamental knowledge on laws of mechanics and Computation of equilibrium of forces to know the different types of support and reactions	Remember/ Analyse/ Apply
CO2	Explain the concepts of different types of static frictions and Analyse the truss member by different methods	Remember/ Analyse/ Apply
CO3	Compute the centroid and second moment of area for various sections	Remember/ Analyse/ Apply
CO4	Examine the different types of motion in dynamics of particles	Remember/ Analyse/ Apply
CO5	Compute the mass, force and acceleration using Newton's law and D'Alembert's principle	Remember/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	2		1				3
CO2	3	2	3	1	1	2		1				3
CO3	3	2	2	1	1	1		1				3
CO4	3	2	3	1	1	1		1				3
CO5	3	2	3	1	1	2		2				3
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember (Re)	10	10	20
Apply (Ap)	30	30	50
Analyse (An)	20	20	30
Create (Cr)		-	-

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K.S.Rangasamy College of Technology –Autonomous								R2022
61 CE 201- APPLIED MECHANICS								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Statics and Equilibrium of Rigid Bodies Introduction to statics- Parallelogram laws of forces – Concurrent Forces and Non concurrent forces- Parallel Forces – Laws of Forces- Lames Theorem, Newtons law of Motion -Varignon's Theorem –Traiangle law of forces- Equilibrium of particles – Free body diagram- Types of Supports and Reactions - Simple problems in reactions – Moments and Couples – Moment of Forces about a point and about an axis	**[12]**
Frictions and Application of Statics Friction – Frictional forces – Laws of coulomb's friction – Simple contact friction- Ladder friction – Belt friction – Rolling resistance – Trusses - Analysis of Truss – Method of joints and Method of Section.	**[12]**
Properties of Surfaces and Solids* Determination of Areas and Volumes- Pappus Guldinus Theorem – Radius of gyration - First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section – Second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.	**[12]**
Dynamics of Particles – Kinematics* Displacement, Velocity and acceleration, their relationship – Relative motion – Plane Motion - Rectilinear motion -–Projectile motion	**[12]**
Dynamics of Particles - Kinetics* Newton's law – D' Alembert's Principle - Principles of Work Energy Equation of particles – Impulse and momentum – Impact of elastic bodies	**[12]**
Total Hours: 45 + 15(Tutorial)	**60**

Textbook(s):

1.	N.H.Dubey., "Engineering Mechanics - Statics and Dynamics", Tata Mc Graw Hill Private Ltd., New Delhi, 2013.
2.	Palanisamy, M.S. and Nagan, S., " Engineering Mechanics- Statics and Dynamics", Tata Mc Graw Hill Private Ltd., New Delhi, 2008.

Reference(s):

1.	Bansal, R.K., "Engineering Mechanics", Laxmi Publications Private Ltd, New Delhi, 2017.
2.	Beer, F.P and Johnson Jr. E.R., "Vector Mechanics for Engineers - Statics and Dynamics", McGraw-Hill International Edition, 2009.
3.	Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.
4.	Irving H. Shames., "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., 2003.

* **SDG 9: Industry, innovation and infrastructure**

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Course Contents and LectureSchedule

S.No	Topic	No.of Hours
1	**Statics and Equilibrium of Rigid Bodies**	
1.1	Introduction, Units and Dimensions, Laws of Mechanics	1
1.2	Parallelogram laws of forces	1
1.3	Resultant of concurrent and non-concurrent forces	1
1.4	Conditions of Static Equilibrium	1
1.5	Free body diagram, Types of supports and their reactions	1
1.6	Equilibrium of Rigid bodies in two dimensions	1
1.7	Application problems in reactions	1
1.8	Moment of a force –about an axi s	1
1.9	Moment of a force about the point	1
1.10	Tutorials	2
2	**Frictions and Application of Statics**	
2.1	Fundamentals of friction	1
2.2	Angle of repose and cone of friction	1
2.3	Frictional force, Laws of Coloumb friction, Simple contact friction	1
2.4	Ladder friction	1
2.5	Belt friction	1
2.6	Rolling resistance	1
2.7	Trusses and its methods of analysis	1
2.8	Simple Problems in Method of joints.	1
2.9	Simple Problems in Method of Section.	1
2.10	Tutorials	2
3	**Properties of Surfaces and Solids**	
3.1	Determination of Areas and Volumes-Centroid	1
3.2	Moment of Inertia of plane area (Rectangle, circle, triangle using Integration Method)	1
3.3	Moment of Inertia of plane area(T section, I section)	1
3.4	Moment of Inertia of plane area (Angle section)	1
3.5	Moment of Inertia of plane area(Hollow section)	1
3.6	Parallel axis theorem	1
3.7	perpendicular axis theorem	1
3.8	Polar moment of inertia	1
3.9	Mass moment of inertia of thin rectangular section.	1
3.10	Tutorial	2
4	**Dynamics of Particles – Kinematics**	
4.1	Kinematics: Displacement, Velocity and acceleration	1

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4.2	Relative motion	1
4.3	Plane Motion	1
4.4	Rectilinear motion	2
4.5	Projectile motion	1
4.6	Simple Problems in Kinematics	1
4.7	Tutorial	2
5	**Dynamics of Particles - Kinetics**	
5.1	Kinetics	1
5.2	Newton's law	1
5.3	D' Alembert's Principle	1
5.4	Principles of Work Energy Equation of particles	1
5.5	Impulse and momentum	2
5.6	Impact of elastic bodies	1
5.7	**Tutorials**	2
	Total	**60**

Course Designers

1. Dr.J.Abdul Bari - abdulbari@ksrct.ac.in

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60 MY 001	Environmental Studies and Climate Change (Common to all)	Category	L	T	P	Credit
		MC	2	0	0	0

Objectives

- To understand the importance of ecosystem and biodiversity.
- To analyze the impacts of pollution, control and legislation.
- To enlighten awareness and recognize the social responsibility in environmental issues.
- To enlighten the waste management

Prerequisite

-Nil-

Course Outcomes

On the successful completion of the course, students will be able to		
CO1	Understand the impacts of pollution on climate change	Understand
CO2	Enhance the awareness the methods of waste management.	Apply
CO3	Examine the value of sustainable future	Evaluate
CO4	Evaluate the clean and green development for environmental problem	Evaluate
CO5	Analyze the role of Geo-science in environmental management	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	3	2	3	3	3	3	1	3	2	3
CO 2	3	3	3	3	2	3	3	3	3	2	2	3
CO 3	3	3	3	3	3	3	3	3	2	2	2	3
CO 4	2	2	3	3	-	1	3	3	2	2	1	2
CO 5	3	3	3	3	3	3	3	3	3	2	2	3
3- Strong; 2-Medium; 1-Some2												

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	-
Understand	20	20	20	
Apply	30	30	30	
Analyze	30	30	30	-
Evaluate	-	-	-	-
Create	-	-	-	-

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Syllabus

K.S.RangasamyCollegeofTechnology–AutonomousR2022								
60 MY 001– Environmental Studies and Climate Change								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	2	0	0	30	0	100	-	100

Pollution and its impact on climate change* Pollution: Sources and impacts of air pollution – greenhouse effect- global warming- climate change - ozone layer depletion - acid rain. Carbon Footprint - Climate change on various sectors – Agriculture, forestry and ecosystem – climate change mitigation and adaptation. Action plan on climate change. IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes. *Activity*: Study of carbon emission nearby place or industry	[6]
Integrated Waste Management* Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan – Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste - risk management: Collection, segregation, treatment and disposal methods. Waste water treatment- ASP *Activity*: Analysis and design of waste management systems, prepare a model / project -wealth from waste.	[6]
Sustainable development practices** Sustainable development goals (SDGs) **–** Green computing- Carbon trading - Green building – Eco-friendly plastic – Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power. Water scarcity- Watershed management, ground water recharge and rainwater harvesting. *Activity*: Select a topic and analyze the value of sustainable development.	[6]
Environment andAgriculture*: Organic farming – bio-pesticides- composting, bio composting, vermi-composting, roof gardening and irrigation. Waste land reclamation. Climate resilient agriculture. Green auditing *Activity*: Prepare a green auditing report on energy, water etc	[6]
Geo-science in natural resource management Data base software in environment information, Digital image processing applications in forecasting. GPS, Remote Sensing and Geographical Information System (GIS), World wide web (www), Environmental information system (ENVIS). *Activity*: Prepare the report using IT tool	[6]
TotalHours	30

TextBook(s):	
1.	Anubha Kaushik , C P Kaushik. Perspectives In Environmental Studies, New Age International publishers; Sixth edition (1 January 2018)
Reference(s):	
1.	G.Tyler Miller Environmental Science 14th Edition Cengage Publications, Delhi, 2013
2.	Gilbert M.Masters and Wendell P. Ela,"Environmental Engineering And Science", Phi Learning Private Limited, 3rd Edition,2015
3.	Erach Bharucha. Textbook of Environmental Studies for Undergraduate Courses, Universities Press, 2000

*__SDG:3 – Climate Action__
**__SDG:6 – Clean Water and Sanitation__
**__SDG:7 – Affordable and Clean Energy__

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Course Contents and Lecture Schedule		
S.No.	**Topic**	**No. of hours**
1.0	**Pollution and its impact on climate change**	
1.1	Pollution: Sources and impacts of air pollution – green house effect- Global warming- climate change - ozone layer depletion - acid rain	**2**
1.2	Climate change on various sectors: Agriculture, forestry and ecosystem. – climate change mitigation and adaptation	**1**
1.3	Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes	**1**
2.0	**Integrated Waste Management**	
2.1	Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan	**1**
2.2	Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste	**1**
2.3	Risk management: Collection, segregation, treatment and disposal methods.	**1**
2.4	Waste water treatment- ASP	**1**
3.0	**Sustainable development practices**	
3.1	Sustainable development goals (SDGs) **–** Green computing- Carbon trading - Green building – Eco- friendly plastic	**1**
3.2	Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power	**2**
3.3	Water scarcity- Watershed management, ground water recharge and rainwater harvesting	**1**
4.0	**Environment andAgriculture**	
4.1	Organic farming – bio-pesticides	**1**
4.2	Composting, bio composting, vermi-composting	**1**
4.3	Roof gardening and irrigation	**1**

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4.4	Waste land reclamation. Climate resilient agriculture, Green auditing	**1**
5.0	**Geo-science in natural resource management**	
5.1	Data base software in environment information, Digital image processing applications in forecasting	**2**
5.2	GPS, Remote Sensing and Geographical Information System (GIS)	**1**
5.3	World wide web (www), Environmental information system (ENVIS)	**1**
	Total	**20**

CourseDesigners

Dr.T.A.SUKANTHA
Dr.B.SRIVIDHYA
Dr.K.PRABHA
Dr.S.MEENACHI
Mr.K.TAMILARASU
Ms.D.KIRTHIGA

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60 GE 002	Tamils and Technology (Common to all Branches)	Category	L	T	P	Credit
		GE	1	0	0	1

Objectives

- To learn weaving, ceramic and construction technology of Tamils.
- To understand the agriculture, irrigation and manufacturing technology of Tamils.
- To realize the development of scientific Tamil and Tamil computing.

Pre-requisites

-NIL-

Course Outcomes

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

CO1	Understand the weaving and ceramic technology of ancient Tamil people nature.	Understand
CO2	Comprehend the construction technology, building materials in sangam period and case studies.	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							3	3		2		3
CO2							3	3		2		3
CO3							3	3		2		3
CO4							3	3		2		3
CO5							3	3		2		3
3- Strong; 2-Medium; 2-Low												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination(Marks)
	1	2	
Remember	20	20	50
Understand	30	20	30
Apply	10	10	20
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
60 GE 002- Tamils and Technology								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1	10	00	100

Weaving and Ceramic Technology* Weaving Industry during Sangam Age – Ceramic Technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	[3]
Design and Construction Technology* Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period - Type Study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu Houses , Indo – Saracenic architecture at Madras during British Period.	[3]
Manufacturing Technology* Art of Ship Building – Metallurgical studies – Iron Industry – Iron smelting ,Steel -Copper and gold coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads – Terracotta beads – Shell beads/bone beats – Archeological evidences -Gem stone types described in Silappathikaram.	[3]
Agriculture and Irrigation Technology* Dam,Tank,Ponds,Sluice,Significance of Kumizhi Thoompu of Chola Period,Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea- Fisheries – Pearl – Conche diving -Ancient Knowledge of Ocean – Knowledge Specific Society.	[3]
Scientific Tamil and Tamil Computing* Development of Scientific Tamil – Tamil Computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy- Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	[3]
Total Hours	**15**

TextBook(s):

1.	தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு).
4.	பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).

*SDG:4- Quality Education

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60 GE 002	தமிழரும் தொழில்நுட்பமும் (அனைத்து துறைகளுக்கும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1

பாடத்தின் நோக்கங்கள்:

- தமிழர்களின் சங்ககால நெசவு, பனை வனைதல் மற்றும் கட்டிட தொழில் நுட்பம் குறித்து அறிதல்.
- தமிழர்களின் சங்ககால வேளாண்மை, நீர்ப்பாசனம் மற்றும் உற்பத்தி முறைகள் குறித்த கற்றல்.
- நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிதல்.

முன்கூட்டிய துறைசார் அறிவு:

தேவைஇல்லை

Course Outcomes

பாடத்தைவெற்றிகரமாகமுடித்த பின்பு, மாணவர்களால் முடியும்விளைவுகள்

CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல்	புரிதல்
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமானப் பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்த அறிவு.	புரிதல்
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.	புரிதல்
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.	புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்துதலும்.	பகுப்பாய்வு

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							3	3		2		3
CO2							3	3		2		3
CO3							3	3		2		3
CO4							3	3		2		3
CO5							3	3		2		3
3- Strong; 2-Medium; 2-Low												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination(Marks)
	1	2	
Remember	20	20	50
Understand	30	20	30
Apply	10	10	20
Analyse	0	0	0
Evaluate	0	0	0

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Create	0	0	0

Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
60GE 002 - **தமிழரும் தொழில்நுட்பமும்**								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1	100	00	100

நெசவு மற்றும் பானைத் தொழில்நுட்பம்: * சங்ககாலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம்-கருப்பு சிவப்புபாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.	[3]
வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: * சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில்வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கல் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ -சாரோசெனிக் கட்டிடக் கலை.	[3]
உற்பத்தித்தொழில்நுட்பம்: * கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை -இரும்பை உருக்குதல்,எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள்- நாணயங்கள் அச்சடித்தல்- மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள் ,கண்ணாடிமணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.	[3]
வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம்: * அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம்- கால்நடை பராமரிப்பு - கால்நடைகளுக்கான வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு -மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டையஅறிவு - அறிவுசார்	[3]
அறிவியல் தமிழ் மற்றும் கணித்தமிழ்* அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்புசெய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்	[3]
Total Hours	**15**

TextBook(s):

1.	தமிழகவரலாறு- மக்களும்பண்பாடும்கே. கே .பிள்ளை (வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2.	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).

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3.	கீழடி – வைகைநதிக்கரையில்சங்ககாலநகர நாகரீகம் (தொல்லியல்துறைவெளியீடு).
4.	பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல்துறைவெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

***SDG:4- Quality Education**

Category	L	T	P	Credit

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60 CS 0P1	C PROGRAMMING LABORATORY

ES	0	0	4	2

Objective

- To enable the students to apply the concepts of C to solve simple problems
- To use selection and iterative statements in C programs
- To apply the knowledge of library functions in C programming
- To implement the concepts of arrays, functions, structures and pointers in C
- To implement the file handling operations through C

Prerequisite

NIL

Course Outcomes

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

CO1	Read, display basic information and use selection and iterative statements.	Apply
CO2	Demonstrate C program to manage collection of related data.	Apply
CO3	Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts.	Apply
CO4	Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives.	Apply
CO5	Demonstrate C program to store and retrieve data using file concepts.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3				2	2		2	3	3
CO2	3	3	3		3				2	2		2	3	3
CO3	3	3	3		3				2	2		2	3	3
CO4	3	3	3		3				2	2		2	3	3
CO5	3	3	3		3				2	2		2	3	3
3- Strong; 2-Medium; 1-Low														

List of Experiments

1. Implementation of Simple computational problems using various formulas*
2. Implementation of Problems involving Selection statements*

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3. Implementation of Iterative problems e.g., sum of series*
4. Implementation of 1DArray manipulation*
5. Implementation of 2D Array manipulation*
6. Implementation of String operations*
7. ImplementationofSimplefunctionsanddifferentwaysofpassingargumentstofunctionsand Recursive Functions*
8. Implementation of Pointers*
9. Implementation of structures and Union*
10. Implementation of Bit Fields, Typedef and Enumeration*
11. Implementation of Preprocessor directives*
12. Implementation of File operations*

*** SDG:4- Quality Education**

CourseDesigners

1. Dr.P.Kaladevi - kaladevi@ksrct.ac.in

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60 ME 0P1	FABRICATION AND REVERSE ENGINEERING LABORATORY (COMMON TO ALL BRANCHCES)

Category	L	T	P	Credit
ES	0	0	4	2

Objectives

- To make the students gain practical knowledge to co-relate with the theoretical studies and to acquire skills on operating the hand tools and instruments.
- To provide hands on training on Fitting, Carpentry, Sheet metal, Welding and machine
- To offer real time activity on plumbing connections in domestic applications tools.
- To provide hands on training on house hold wiring and electronic circuits.
- To provide hands on activities on dismantling, assembling of the computer internal components and peripherals.

Pre-requisite

Nil

Course Outcomes

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

CO1	Perform facing, plain turning and drilling.	Apply
CO2	Make a model of fitting, carpentry, sheet metal and welding joints.	Apply
CO3	Construct the water pipe line in plumbing shop.	Apply
CO4	Trouble shoots the electrical and electronic circuits and realizes the importance of earthing.	Apply
CO5	Identify and install computer internal components and peripherals	Apply

Mapping with Programme outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	3	1	3	2	3	1	2	3
CO2	3	3	3	1	3	2	1	2	3	3	1	3
CO3	3	3	3	1	3	2	2	2	3	3	2	3
CO4	3	3	3	2	3	3	2	3	3	1	1	3
CO5	3	3	3	3	3	2	2	2	3	2	2	3
3- Strong; 2-Medium; 1-Low												

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List of Experiments

Machine Shop Exercises

1. Facing and Turning Operations
2. Drilling Operations

Fitting Exercises

3. Filling Operations
4. Filling and Cutting Operations on MS Plates for Square joint

Carpentry Exercises

5. Planning Operations
6. Joining of Wooden piece by Dovetail Joint

Sheet Metal Exercises

7. Making of Sheet Metal of Rectangular Tray
8. Making of Sheet Metal t of Cone Shape & Scoop

Welding Exercises

9. Arc Welding of MS Plates by Lap joint , Butt joint,&T-Joint

Plumbing Exercises

10. Assembly of GI pipes/PVC and Pipe Fitting
11. Cutting of Threads in GI pipes / PVC by thread Cutting Dies

Electrical Wiring Exercises

12. Wiring circuits for Filament lamps/CT using Single (One way) Switch
13. Wiring circuits for Filament lamps/CT using Stair Case (Two Way) Switch
14. Wiring Circuits for a Fluorescent lamp (Tube Light Circuit)

Electronics Exercises

15. Current limiting resistor calculation for light emitting diode (LED).
16. Forward bias & Reverse bias of a PN junction diode.

Computer Hardware Exercise

17. Identify computer peripherals and internal components.
18. Dismentle and assemble of desktop computer systems.

Course Designers

1. Mr..S.Venkatesan – venkatesans@ksrct.ac.in

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60 CG 0P1	CAREER SKILL DEVELOPMENT- I	Category	L	T	P	Credit
		CGC	0	0	2	0

Objective

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Prerequisite

Basic knowledge of reading and writing in English.

CourseOutcomes

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

CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyze
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Appraise the verbal ability skills in the career development and professional contexts	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1								2	3	3	2	3		
CO2								2	3	3	2	3	2	2
CO3								2	3	3	2	3		
CO4								2	3	3	2	3	2	2
CO5								2	3	3	2	3		2

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
60 CG 0P1 -Career Skill Development I								
Common to All Branches								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
II	0	0	2	45	0	100	00	100

Listening* Listening for general information-specific details - audio / video (formal & informal) - Listen to podcasts/ TED talks/ anecdotes / stories / event narration / documentaries and interviews with celebrities - Listen to a product and process descriptions, advertisements about products or services.	[5]
Speaking* Self-Introduction; Introducing a friend; conversation - politeness strategies - Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews - Picture description; giving instruction to use the product; presenting a product - Small Talk; Mini presentations - Group discussions, debates & role plays.	[5]
Reading* Loud reading vs Silent reading, Skimming & Scanning of passages, reading brochures (technical context), social media messages relevant to technical contexts and emails - Biographies, travelogues, newspaper reports and travel & technical blogs - Advertisements, gadget reviews and user manuals - Newspaper articles and Journal reports - Editorials; and opinion blogs	[5]
Writing* Writing letters – informal and formal – basics and format orientation - paragraph texting, short report on an event (field trip etc.) - Definitions; instructions; and product /process description - Note-making / Note-taking; recommendations; transferring information from non-verbal (charts, graphs to verbal mode) - Essay texting	[5]
Verbal Ability I* Reading Comprehension (MCQs) – Cloze Test - Sequencing of sentences – Summarizing and paraphrase – Error Detection – Spelling Test – Sentence Improvement - Preposition	[5]
TotalHours	25

Reference(s):

1.	'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020
3.	Michael McCarthy and Felicity O Dell, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, 'A Course Book on Technical English' Scitech Publications (India) Pvt. Ltd. 2020

*** SDG- 04- Quality Education**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1		
1.1	Listening for general information and Specific details	1
1.2	Listening to podcasts, documentaries and interviews with celebrities	1
1.3	Narrating personal experiences	1
1.4	Readingrelevant to technical contexts and emails	1
1.5	Listen to a product and process descriptions	1
2	**Speaking**	
2.1	Self-introduction	1
2.2	Summarizing of documentaries& Picture Narration	1
2.3	Small Talk; Mini presentations	1
2.4	Group discussions, debates & role plays.	1
2.5	Group discussions	1
3	**Reading**	
3.1	Loud reading vs Silent reading, Skimming & Scanning of passages	1
3.2	Reading social media messages relevant to technical contexts	1
3.3	Reading newspaper reports and travel & technical blogs	1
3.4	Reading advertisements, gadget reviews and user manuals	1
3.5	Reading newspaper articles and journal reports	1
4	**Writing**	
4.1	Writing letters – informal and formal	1
4.2	Paragraph Texting	1
4.3	Definitions and instructions	1
4.4	Note-making / Note-taking	1
4.5	Essay texting	1
5	**Verbal Ability**	
5.1	Reading Comprehension (MCQs) and Cloze Test	1
5.2	Sequencing of sentences	1
5.3	Paraphrasing and Summarizing	1
5.4	Error Detection and Spelling Test	1
5.5	Prepositions	1
	Total	**25**

1.

CourseDesigner

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

THIRD SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 MA 007	Statistics and Numerical Methods	2	40	60	100	45	100
2	61 CE 301	Strength of Materials	2	40	60	100	45	100
3	60 CE 302	Fluid Mechanics and Hydraulics Machinery	2	40	60	100	45	100
4	60 CE 303	Surveying	2	40	60	100	45	100
5	60 CE 304	Construction Materials and Practices	2	40	60	100	45	100
6	60 CE 305	Engineering Geology	2	40	60	100	45	100
PRACTICAL								
8	60 CE 3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	3	60	40	100	45	100
9	60 CE 3P2	Surveying Laboratory	3	60	40	100	45	100
10	60 CG 0P2	Career Skill Development II	3	100	-	100	-	-
11	60 CG 0P6	Internship						

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 MA 007	Statistics and Numerical Methods	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To provide an understanding of the statistical methods and distribution concept by which real life problems are analyzed.
- To learn basic concepts in descriptive statistics.
- To apply numerical techniques for solving system of linear equations.
- To understand and apply the concepts of interpolation and numerica lintegration.
- To solve initial value problems of ordinary differential equations numerically.

Pre-requisites

-NIL-

Course Outcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Understand the basic concepts of probability and random variables.	Remember, Understand,Apply
CO2	Apply Student's t test, F test and Chi-square test for testing the statistical hypothesis.	Remember, Understand, Apply
CO3	Compute measures of central tendency, measures of dispersion and correlation coefficient.	Remember, Understand, Apply
CO4	Employvarious iteration techniques for solving algebraic, transcendental and system of linear equations.	Remember, Understand, Apply
CO5	Apply different techniques to find the intermediate values and to evaluate single definite integrals.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2							2		3	
CO2	3	3	3	3	3							2		3	
CO3	3	3	3	3	2							2		3	
CO4	3	3	3	2	3							2		3	
CO5	3	3	3	2	3							2		3	

3 - Strong;2 - Medium;1 – Some

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		Model Exam (Marks)	End Sem Examination (Marks)
	1	2		
Remember (Re)	10	10	10	10
Understand (Un)	10	10	20	20
Apply (Ap)	40	30	60	60
Analyze (An)	0	10	10	10
Evaluate (Ev)	0	0	0	0
Create (Cr)	0	0	0	0
Total	60	60	100	100

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
60 MA 007- Statistics and Numerical Methods								
Common to Mech, MCT and Civil								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Probability and Random Variables Axioms of probability - Conditional probability - Baye's theorem - Random variable - Expectation - Probability mass function - Probability density function - Moment generating function.	[9]
Standard Distributions and **Testing of Hypothesis*** Binomial distribution - Poisson distribution – Type I and Type II errors - Test of significance of small samples - Student's 't' test - Single mean - Difference of means - F-test - Chi-square test - Goodness of fit - Independence of attributes.	[9]
Empirical Statistics **Measures of central tendency***: Mean, Median, Mode - Measures of dispersion: Range - Quartile deviation - Standard deviation - Measures of skewness: Bowley's co-efficient of skewness - Pearson's co-efficient of skewness- Correlation.	[9]
Solutions of Equations and Eigen Value Problem Algebraic and Transcendental equations - Newton Raphson method – RegulaFalsi method -Gauss elimination method - Gauss Jordan method - Iterative methods: Gauss Jacobi method - Gauss Seidel method - Eigen value of a matrix by Power method.	[9]
Interpolation and Numerical Integration **Lagrange's and Newton's divided difference interpolation (unequal intervals)** - Newton's forward and backward interpolation (equal intervals)**** - Two point and three point Gaussian quadrature - Trapezoidal, Simpson's 1/3 and 3/8 rule (single integral).	[9]
Lecture: 45 + Tutorial:15=TotalHours	**60**

Text Books:

1.	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2.	V. K. Kapoor and S.C.Gupta , "Fundamentals of Mathematical Statistics ", Sultan Chand & sons 12th Edition, New Delhi, 2020.

Reference(s):

1.	Veerarajan,T., "Probability, Statistics and Random Processes (with Queueing Theory and Queueing Networks)", Tata McGraw-Hill 4th Edition, New Delhi, 2015.
2.	Johnson R.A and Gupta C.B., "Miller and Freund's Probability and statistics for Engineers'', 11th Edition, PearsonEducation,Asia,2011.
3.	KandasamyP,Thilakavathy K.andGunavathyK.,"NumericalMethods",3rdEdition,S.ChandandCo.,NewDelhi, 2003.

***SDG:4 Quality Education,**
****SDG:9 Industry, Innovation, and Infrastructure**

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S.No	Topic	No.ofHours
1	**StandardDistributionsandTestingofHypothesis**	
1.1	BinomialDistribution	1
1.2	Poisson Distribution	1
1.3	Exponential a n d GeometricDistributions	1
1.4	t test	1
1.5	Tutorial	2
1.6	F test	1
1.7	Chi- squaretest	1
1.8	TestforIndependency	1
1.9	Goodness offit.	1
1.10	Tutorial	2
2	**BasicStatistics**	
2.1	Mean, Median and Mode	1
2.2	Range, Quartile deviation	1
2.3	Standard deviation	1
2.4	Tutorial	2
2.5	Pearson's co-efficient ofskewness	1
2.6	moments	1
2.7	kurtosis	1
2.8	correlation	1
2.9	rankcorrelation	1
2.10	Tutorial	2
3	**SolutionofEquationsandEigenValueProblems**	
3.1	Newton Raphson method	1
3.2	Gauss elimination method	1
3.3	Gauss Jordan method	1
3.4	Gauss Jacobi	1
3.5	Tutorial	2
3.6	Gauss Seidel	1
3.7	Matrix inversion by Gauss Jordan method	1
3.8	Eigen values of a matrix by powermethod	1
3.9	Tutorial	2
4	**InterpolationandNumericalIntegration**	
4.1	Lagrange's interpolations	1
4.2	Newton's divided difference interpolations	1
4.3	Tutorial	2
4.4	Newton's forward and backward difference interpolations	1
4.5	Two and three point Gaussian quadratures	1
4.6	Single integration using Trapezoidal andSimpson's1/3and3/8rules	1
4.7	Tutorial	2
5	**NumericalSolutionofOrdinaryDifferentialEquations**	
5.1	Taylor's series method	1
5.2	Euler's method	1

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5.3	modified Euler's method	1
5.4	Tutorial	2
5.5	Fourth order Runge – Kuttamethod	1
5.6	Milne's method	1
5.7	Adam's method	1
5.8	Tutorial	2
	Total	60

List of MATLAB programmes:

1. Calculate the standard parameters by using Binomial distribution.
2. Determine the Measures of central tendency.
3. Compute the measures of dispersion.
4. Solve the Equation by using Gauss Seidel method.
5. Numericalintegration using Trapezoidal and Simpson's rules.
6. To solve Ordinary differential equations by Taylor's series method.

Course Designers

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61 CE 301	STRENGTH OF MATERIALS	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To learn the fundamental concepts of Stress, Strain and deformation of solids.
- To know bending stress and shear stress distribution in various sections.
- To calculate the deflection of beams under the application of external forces.
- To evaluate the performance of columns.
- To assess the behaviour of shaft, Cylinders and springs.

Prerequisite

Fundamentals of Mathematics, knowledge of strength of materials and its mechanics

Course Outcomes

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

CO1	Understand various types of stresses and strains developed in the member.	Evaluate
CO2	Sketch the bending and shear stress distribution of a member.	Evaluate
CO3	Compute the deflection of beams by different methods and selection of method for determining slope or deflection.	Evaluate
CO4	Describe the failure modes for various types of columns.	Evaluate
CO5	Analyze the members subjected to torsion.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	1	2	2	3	2	2	1
CO2			3		2	1			3		2	1
CO3	2	2	3	2	2	1	2	2	3	2	2	1
CO4			3		2	1			3		2	1
CO5	1	1	3	2	3	1	1	1	3	2	3	1
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	10	10	20
Analyse	10	10	20
Evaluate	10	10	10
Create	10	10	30

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K.S.Rangasamy College of Technology–AutonomousR2022								
61 CE 301 - STRENGTH OF MATERIALS								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Stress, Strain and Deformation of Solids* Introduction – Stress, Strain – Types – Elastic limit – Hooke's law – Stress Strain curves – Elastic constants – Relationship between Elastic constants. Simple and Compound bars – Principles of Superposition – Varying cross section – Thermal stress in composite bars - Principal stresses and principal planes	**[09]**
Stresses in Flexural Members* Beams – Types of beams - Statically determinate beams subjected to simple loading – Shear force and Bending Moment – Shear Force Diagram and Bending Moment Diagram –Point of contra flexure - Relationship between load, shear force and bending moment -Theory of simple bending – bending equation –Flexural rigidity- Bending stress distribution in symmetrical sections. Shear stress-Variation of shear stress in beam cross section – Shear stress distribution for symmetrical sections.	**[09]**
Deflection of Beams** Deflection: Methods - Integration method, Macaulay's method, Conjugate beam method, Area moment Method.	**[09]**
Compression Members** Column / strut : Types- modes of failure-Factor of safety- Euler's expression for crippling load for different end conditions - Rankine's Gordon formula-Combined and bending stress-Core section.	**[09]**
Torsion of shaft, Cylinders and Springs* Theory of simple torsion –torsion equation - Torsional rigidity - Polar modulus - Stresses in solid and hollow circular shafts – Power transmitted by a shaft. Springs: Types-Applications-Deflection.Thin and Thick Cylinder: Analysis – internal pressure – deformation – Introduction to compound cylinders.	**[09]**
Total Hours: 45 + 15(Tutorial)	**60**

Textbook(s):	
1.	R K Bansal, "Text book of Strength of Materials", Laxmi Publications Pvt. Ltd, New Delhi, 2012.
2.	R K Rajput, "Strength of Materials", S.Chand & Company Ltd, New Delhi, 2015.
Reference(s):	
1.	F P Beer and E R Johnston, "Mechanics of Materials", Tata McGraw Hill, New Delhi,2014
2.	Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2009.
3.	S Ramamrutham, "Strength of materials", Dhanpat Rai Publishing Company, New Delhi, 2014.
4.	S Timoshenko, "Strength of Materials", C B S Publishers & distributors, New Delhi, 2002

***SDG:4 Quality Education, **SDG:9: Industry, innovation and infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Stress, Strain and Deformation of Solids**	
1.1	Introduction – Force on a particle, coplanar forces and resultant of several concurrent forces	1
1.2	Introduction to stress and strain,tensile, compressive and shear stress and strain	1

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1.3	Hooke's law ,Young's Modulus, Rigidity Modulus, Bulk Modulus, Poisson's Ratio	1
1.4	Tutorial	2
1.5	External and internal forces, free body diagram and equilibrium of a rigid body	2
1.6	Various boundary conditions.	2
2	**Stresses in Flexural Members**	
2.1	Beams and its types Flexural rigidity	1
2.2	Shear force and Bending Moment Diagram in Beams	2
2.3	Point of Contraflexure - Relationship between load, SF and BMD	1
2.4	Theory of simple bending	1
2.5	Bending equation	1
2.6	Bending stress distribution in symmetrical sections. Shear stress	1
2.7	Variation of shear stress in beam cross section- Shear stress distribution for symmetrical sections.	1
2.8	Tutorial	1
3	**Deflection of Beams**	
3.1	Determination of slope and deflection of determinate beams by Integration method	2
3.2	Determination of slope and deflection of indeterminate beams by Integration method	2
3.3	Determination of slope and deflection of determinate beams by Macaulay's method	1
3.4	Determination of slope and deflection of indeterminate beams by Macaulay's method	1
3.5	Determination of slope and deflection of determinate beams by Conjugate beam method	1
3.6	Determination of slope and deflection of determinate beams by Area moment Method	1
3.7	Determination of slope and deflection of in determinate beams by Area moment Method	1
3.8	Tutorial	2
4	**Compression Members**	
4.1	Introduction, Difference between column and struts	2
4.2	Types of columns	1
4.3	Modes of failure	1
4.4	Factor of safety	1
4.5	Euler's expression for crippling load for different end conditions	1
4.6	Tutorial	2
4.8	Determination of crippling load for different end condition using Rankine's Gordon formula	1
4.9	Combined and bending stress-Core section.	1
4.10	Tutorial	2
5	**Torsion of shaft, Cylinders and Springs**	
5.1	Introduction, derivation of torsion equation	2
5.2	Power transmitted by shafts and design of shafts	1

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5.3	Torsional rigidity & Polar modulus	1
5.4	Stresses in solid and hollow circular shafts	1
5.5	Tutorial	2
5.6	Deflection.Thin and Thick Cylinder	1
5.7	Analysis of internal pressure	1
5.8	Introduction to compound cylinders	1
5.9	Problems in Springs	1
5.10	Tutorial	2
	Total	**60**

Course Designers

1. Dr.K.VIJAYA SUNDRAVEL - vijayasundravel@ksrct.ac.in

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60CE302	Fluid Mechanics and Hydraulics Machinery	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To be able to study the importance of various properties and characteristics of fluids.
- To solve fluid statics and kinematic problems such as pressure measurement, particle paths and streamlines.
- To derive the equation of conservation of mass and its application.
- To use important concepts of boundary layers theory, continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
- To understand the various flow measuring devices pumps and turbines and analyse its performance.

Prerequisite

Applied Physics.

Course Outcomes

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

CO1	State and explain various fluid properties.	Understand/ Analyse/Apply
CO2	Apply the knowledge of fluid statics for solving the problems in buoyancy and Pressure measurement.	Understand/ Analyse/Apply
CO3	Gain knowledge on fluid kinematics for solving the problems in Stream and Potential functions.	Understand/ Analyse/Apply
CO4	Solve problems in flow dimensional analysis and boundary layer.	Understand/ Analyse/Apply
CO5	Analyze the performance of turbines and pumps.	Understand/ Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		2					2	3		3
CO2	3	2				2			3	2		2
CO3	3	3		3					2	3		3
CO4	3	3		3		3			3	3		3
CO5	3	3		2		3			3	3		2

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Understand (Un)	30	20	40
Apply (Ap)	20	30	40
Analyse (An)	10	10	20
Create (Cr)		-	-

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60CE302-Fluid Mechanics and Hydraulic Machinery								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Fluid Properties, Statics and Kinematics** Fluid Properties: Importance & applications of fluid mechanics. Solid vs Fluid - Units and Dimensions – Properties of fluids (Definition only)-Mass density – Specific weight – Specific volume – Specific gravity – Viscosity – Compressibility – Surface tension – Capillarity – Vapour pressure. Fluid Statics: Hydrostatic law - Pascal's law - Pressure measurement - Buoyancy and meta-centre. Fluid Kinematics: Path line – Stream line – Streak line – Stream and Potential functions – Flow nets.	**[09]**
Fluid Dynamics* Fluid Element and properties - Lagrangian vs Eulerian description – Governing equations: Mass balance (Continuity equation) – Newton's second law (momentum equation- statement only) – First law of thermodynamics (Energy equation-statement only). Non-viscous flows (Euler's equation) – Frictionless flows (Bernoulli's equation), Introduction to CFD.	**[09]**
Flow Through Pipes and Boundary Layer* Laminar and turbulent flows through pipe – Hagen-Poiseuille equation – Darcy-Weishbach equation – Major and Minor losses. Dimensional Analysis- Buckingham's π theorem- Discharge and velocity measurements- venture meter and pitot tube- Boundary layer concept- Displacement and momentum thickness.	**[09]**
Hydraulic Turbines** Force exerted on moving plate/ vanes- Definition and classifications- Pelton, Francis, Propeller and Kaplan turbine: Working principles- Velocity triangle – Work done – specific speed – Efficiencies – Performance curve for turbines.	**[09]**
Hydraulic Pumps ** Definition and classifications- Centrifugal and Reciprocating Pumps: Working principles- Indicator diagram – Specific speed – efficiency and performance curves - Cavitation in pumps.	**[09]**
Total Hours: 45 + 15(Tutorial)	**60**

Textbook(s):	
1.	Bansal, R.K., "A text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi,2019
2.	Rajput, R.K., "A Text book of Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Ltd., NewDelhi, 2015.
Reference(s):	
1.	Modi, P.N. and Seth, S.M., "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House, New Delhi, 2015.
2.	Subramanian, K., "Fluid Mechanics and Hydraulic Machines – Problems and Solutions", Tata McGraw Hill Education, New Delhi, 2010.
3.	Giles, R.V., Evett, J.B. & Liu, C., "Fluid Mechanics and Hydraulics", Tata McGraw Hill, New Delhi, 2015.
4.	R.S.Khurmi, "Fluid mechanics& hydraulic Machines. (in S.I. units)" S CHAND & Company Limited, 2015.

****SDG7: Affordable and Clean Energy**

***SDG9: Industry Innovation and Infrastructure**

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CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**Fluid Properties, Statics and Kinematics**	
1.1	Fluid Properties: Importance & applications of fluid mechanics	1
1.2	Solid vs Fluid - Units and Dimensions	1
1.3	Properties of fluids (Definition only)-Mass density	1
1.4	Specific weight – Specific volume – Specific gravity – Viscosity	1
1.5	Compressibility – Surface tension – Capillarity – Vapour pressure.	1
1.6	Fluid Statics: Hydrostatic law - Pascal's law - Pressure measurement	1
1.7	Buoyancy and meta-centre	1
1.8	Fluid Kinematics: Path line – Stream line – Streak line – Stream	1
1.9	Potential functions – Flow nets.	1
2	**Fluid Dynamics**	
2.1	Fluid Element and properties	1
2.2	Lagrangian vs Eulerian description	1
2.3	Governing equations: Mass balance (Continuity equation)	1
2.4	Governing equations: Mass balance (Continuity equation)	1
2.5	Newton’s second law (momentum equation- statement only)	1
2.6	First law of thermodynamics (Energy equation-statement only)	1
2.7	First law of thermodynamics (Energy equation-statement only)	1
2.8	Non-viscous flows (Euler’s equation)	1
2.9	Frictionless flows (Bernoulli’s equation), Introduction to CFD.	1
3	**Flow Through Pipes and Boundary Layer**	
3.1	Laminar and turbulent flows through pipe	1
3.2	Hagen-Poiseuille equation	1
3.3	Darcy-Weishbach equation	1
3.4	Major and Minor losses	1
3.5	Dimensional Analysis- Buckingham’s π theorem	1
3.6	Discharge and velocity measurements-venture meter and pitot tube	1
3.7	Boundary layer concept	1
3.8	Displacement and momentum thickness	1
4	**Hydraulic Turbines**	
4.1	Force exerted on moving plate/ vanes	1
4.2	Definition and classifications	1
4.3	Pelton, Francis, Propeller	1
4.4	Pelton, Francis, Propeller	1
4.5	Kaplan turbine: Working principles- Velocity triangle	1
4.6	Work done – specific speed	1
4.7	Efficiencies	1
4.8	Performance curve for turbines	2
5	**Hydraulic Pumps**	

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5.1	Definition and classifications	1
5.2	Centrifugal and Reciprocating Pumps	1
5.3	Working principles- Indicator diagram	2
5.4	Specific speed	1
5.5	Efficiency	1
5.6	Performance curves	1
5.7	Cavitation in pumps	2

CourseDesigners

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60CE303	SURVEYING	Category	L	T	P	Credit
		PC	3	0	0	3

Objective

- To be familiar with fundamental knowledge on surveying and survey instruments.
- To carry out levelling and calculate area and volume from contour map.
- To conduct Theodolite Surveying for complex surveying and setting out of curves.
- To introduce the concepts of Control Surveying and Survey adjustments
- To know various modern instruments used in surveying.

Prerequisite

Basic knowledge of properties learnt in Physical Science and Mathematical courses.

Course Outcomes

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

CO1	Demonstrate the rudiments of various surveying and its principles.	Knowledge/ Analyse/ Apply
CO2	Acquire knowledge on applications of levelling and contouring.	Knowledge/ Analyse/ Apply
CO3	Imparts concepts of Theodolite Surveying for complex surveying operations like tachometry, Trigonometry and Setting out of Curves.	Knowledge/ Analyse/ Apply
CO4	Construct the procedure for establishing horizontal and vertical control while surveying and practice to obtain probable value.	Knowledge/ Analyse/ Apply
CO5	Imparts the knowledge on modern surveying instruments	Knowledge/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	2	2	3	3	2	3
CO2	3	3	3	2	2	2	2	2	3	3	2	3
CO3	3	3	3	3	3	2	2	3	3	3	2	3
CO4	3	3	3	3	3	2	2	3	3	3	3	3
CO5	2	2	2	3	3	2	2	3	3	3	3	3

3- Strong;2-Medium;1-Some

Assessment Pattern

Bloom's Category	Continuous Assessment Test (Marks)		End Sem. Examination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)		-	-

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K. S. Rangasamy College of Technology–Autonomous R2022								
60CE303 - Surveying								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Fundamentals of Conventional Surveying* Definition – Classifications – Basic principles – Chaining - Equipment and Accessories – Ranging Methods of ranging - Compass – Types - Basic Principles- Bearing – Local attraction – Traversing - Plane table surveying – Accessories - Merits and demerits – Methods – Traversing.	**[09]**
Levelling and Countouring* Levelling - Principles of Levelling - Datum – Bench Marks - Levels and staves - Temporary and Permanent Adjustments- Methods of Levelling- Booking - Reduction - Curvature and refraction correction - Contour - Characteristics of contours - Methods of contouring - Uses of contour – Calculation of areas and volumes.	**[09]**
Theodolite,Tacheometry and Curve Surveying* Theodolite: Description - Temporary and permanent adjustments - Horizontal and vertical angle measurements –– Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry – Trigonometric levelling – Single Plane method – Double Plane method – Curves – Types - Components and setting out of Simple circular curves.	**[09]**
Control Surveying and Adjustment* Horizontal and vertical control - Methods - Triangulation- Baseline - Satellite stations - single and reciprocal observations - traversing – Gale's table - Errors Sources - precautions and corrections - classification of errors - true and most probable values - weighed observations - principle of least squares - normal equation.	**[09]**
Modern Surveying* Total Station: Accessories - Digital Theodolite, EDM, Electronic field book – Advantages –– Working principle – Observables – Errors - Field procedure and applications. GPS: Advantages – System components – Segments - Signal structure – Selective availability and anti-spoofing receiver components and antenna – Planning and data acquisition – Data processing – Errors in GPS – Field procedure and applications.	**[09]**
Total Hours	**45**

Textbook(s):

1.	Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.
2.	Duggal.S.K., "Surveying Volume I", Tata McGraw Hill Education Private Limited, Third Edition, 2011

Reference(s):

1.	R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2.	N.N. Basak, "Surveying and Levelling" Tata McGraw Hill Education Private Limited, Second Edition, 2011.
3.	C. Venkatramaiah, Textbook of Surveying, Universities Press, Second Edition, 2011.
4.	Kanetkar.T.P and Kulkarni.S.V, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2014

***SDG9: Industry Innovation and Infrastructure**

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CourseContents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Fundamentals of Conventional Surveying**	
1.1	Definition – Classifications	1
1.2	Basic principles – Chaining	1
1.3	Equipment and Accessories	1
1.4	Methods of ranging	1
1.5	Compass – Types - Basic Principles	1
1.6	Bearing – Local attraction	1
1.7	Traversing	1
1.8	Plane table surveying – Accessories - Merits and demerits	1
1.9	Methods – Traversing	1
2	**Levelling and Contouring**	
2.1	Levelling - Principles of Levelling – Datum - Bench Marks	1
2.2	Levels and staves - Temporary and Permanent Adjustments	1
2.3	Methods of Levelling	1
2.4	Booking - Reduction	1
2.5	Curvature and refraction correction	1
2.6	Contour - Characteristics of contours	1
2.7	Methods of contouring - Uses of contour	1
2.8	Calculation of areas	1
2.9	Calculation of volumes	1
3	**Theodolite, Tacheometry and Curve Surveying**	
3.1	Theodolite: Description - Temporary and permanent adjustments	1
3.2	Horizontal and vertical angle measurements	1
3.3	Heights and distances – Tacheometric surveying	1
3.4	Stadia Tacheometry	1
3.5	Tangential Tacheometry	1
3.6	Trigonometric levelling – Single Plane and Double Plane method	1
3.7	Curves – Types - Components	1
3.8	Setting out of Simple circular curves	2
4	**Control Surveying and Adjustment**	
4.1	Horizontal and vertical control - Methods	1
4.2	Triangulation - Baseline - Satellite stations	1
4.3	Single and reciprocal observations	1
4.4	Traversing – Gale's table	1
4.5	Errors Sources - precautions and corrections	1
4.6	classification of errors - true and most probable values	1
4.7	weighed observations	1
4.8	principle of least squares	1

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4.9	normal equation	1
5	**Modern Surveying**	
5.1	Total Station: Accessories - Digital Theodolite, EDM, Electronic field book	2
5.2	Advantages –– Working principle – Observables – Errors	1
5.3	Field procedure and applications	1
5.4	GPS: Advantages –System components –Segments -Signal structure	1
5.5	Selective availability and anti-spoofing receiver components and antenna	1
5.6	Planning and data acquisition – Data processing	1
5.7	Errors in GPS	1
5.8	Field procedure and applications	1
	Total	**45**

Course Designer

1. Dr.R.JAGADEESAN - KSRCT - jagadeesan@ksrct.ac.in

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60CE304	CONSTRUCTION MATERIALS AND PRACTICES	Category	L	T	P	Credit
		PC	3	0	0	3

Objective

- To gain knowledge on basic construction materials – Cement, Stone and brick
- To acquire knowledge in miscellaneous construction materials
- To learn the various building components
- To gain knowledge in construction sequence & practices
- To know various equipment used in construction industry

Prerequisite

Basic knowledge of properties learnt in Physical Science courses

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Learn the manufacture and properties of construction materials	Remember/ Understand Analyse/ Apply
CO2	Apply the miscellaneous materials for construction works	Remember/ Understand Analyse/ Apply
CO3	Identify the materials for masonry, flooring and roofing	Remember/ Understand Analyse/ Apply
CO4	Understand the construction sequence and procedures	Remember/ Understand Analyse/ Apply
CO5	Analyse the equipment used in construction industry	Remember/ Understand Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	3	2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	2	2	3	2	3	2	2	2	2	3
CO4	3	2	2	3	3	2	3	3	3	3	3	3
CO5	3	2	2	3	3	2	3	3	3	3	3	3

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember (Re)	10	10	10
Understand (Un)	10	10	20
Apply (Ap)	30	20	50
Analyse (An)	10	20	20

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
60CE304 - Construction Materials and Practices								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Cement, Stone and Bricks* Cement – Manufacture, Grades & Types –Stones – Qualities of good building stone , Test on Stones –Crushing, Abrasion, Impact, Hardness test and Freezing & thawing test-Classification of Bricks &Manufacture of Clay Brick– Test on bricks –Compressive Strength, Water absorption and Efflorescence test - Fly ash bricks - Interlocking bricks	**[09]**
Miscellaneous Construction materials* Paints - Properties, types and defects, Varnishes , Distempers – Timber – Market forms – Industrial timber, Plywood and Veneer- Steel - Aluminium - Application of geotextile materials	**[09]**
Building Components* Substructure & Superstructure - Types of Brick masonry – Types of Stone masonry -Flooring - Granite, marbles, tiles, mosaic, wooden and synthetic flooring – Roofing - Asbestos, galvanized iron and Reinforced cement concrete	**[10]**
Construction Practices* Selection of site for building - Site Clearance – Marking – Earthwork – Temporary shed – Requirements of a goodform work and its types – Scaffolding and its types- Construction joints and its types – Damp proofing- Waterproofing	**[09]**
Construction Equipment* Selection of equipment for earth work: power shovel, scrapers, earth moving equipment – tractors, tipper, dumper, front end loaders – Equipment for foundation: pile driving equipment - Tools used for plastering	**[08]**
TotalHours	**45**

Textbook(s):

1.	R.K.Gupta," Civil Engineering Materials and Practices", Jain Brothers, New Delhi,2014
2.	Rangwala, "Engineering Materials",Charotar Publishing House Pvt., Ltd., Gujarat, 2019

Reference(s):

1.	Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2012
2.	Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015
3.	Rajput R K., "Engineering Materials", S Chand and Company Ltd., 2014
4.	IS 1597 Part 1 & 2 ."Construction of Stone Masonry- Code of Practice" , BIS, New Delhi

***SDG9 – Industry, Innovation and Infrastructure**

CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**Cement, Stone and Bricks**	
1.1	Introduction to construction materials	1
1.2	Cement – Manufacture & Grades	1
1.3	Types of cement	1
1.4	Stones - Qualities of good building stone - Crushing test	1
1.5	Abrasion and Impact test	1

1.6	Hardness test and Freezing & thawing test	1
1.7	Classification of Bricks & Manufacture of Clay Brick	1
1.8	Test on bricks – Compressive Strength & water absorption	1
1.9	Efflorescence test - Fly ash bricks - Interlocking bricks	1
2	**Miscellaneous Construction materials**	
2.1	Paints – Properties & Types	1
2.2	Defects in painting	1
2.3	Varnishes - Components & Types	1
2.4	Distempers – Components & Steps	1
2.5	Timber – Market forms – Industrial timber	1
2.6	Plywood and Veneer	1
2.7	Steel & Aluminium as building material	2
2.8	Application of geotextile materials in construction	1
3	**Building Components**	
3.1	Substructure & Superstructure	1
3.2	Types of Brick masonry	2
3.3	Types of Stone masonry	2
3.4	Selection of flooring materials - Granite, marbles	1
3.5	Tiles and Mosaic flooring	1
3.6	Wooden and Synthetic flooring	1
3.7	Materials for roofing - Asbestos and galvanized iron	1
3.8	Reinforced cement concrete roof	1
4	**Construction Practices**	
4.1	Selection of site for building, Site clearance and marking	1
4.2	Earthwork & temporary shed	1
4.3	Requirements in formwork and stripping time	1
4.4	Different materials used in formwork	1
4.5	Scaffoldings & its types	1
4.6	Different types of joints in construction	2
4.7	Damp-proofing - Materials and process	1
4.8	Water-proofing - Materials and process	1
5	**Construction Equipment**	
5.1	Introduction to construction equipment and selection of equipment	1
5.2	Earthwork- Power shovel & scrapers	2
5.3	Earthmoving equipment -Tractors & tippers	1
5.4	Dumper and front end loaders	1
5.5	Equipment used in foundation works	1
5.6	Pile driving equipment	1
5.7	Tools used for plastering	1
	Total	**45**

CourseDesigners

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60CE305	ENGINEERING GEOLOGY	Category	L	T	P	Credit
		PC	3	0	0	2

Objective

- To understand the importance of earthquake, volcanism.
- To acquire knowledge about various properties of minerals.
- To gain knowledge about the applications of geology in projects such as dams, tunnels, bridges, roads, airport and harbor.

Prerequisite

Basic knowledge on earth structure.

CourseOutcomes

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

CO1	Understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.	Knowledge
CO2	Acquire knowledge about various physical and chemical properties of various minerals with its application.	Apply
CO3	Learn the properties, types and applications of rocks.	Knowledge/ Apply
CO4	Understand about geological map and sub-surface investigation.	Analyse/ Apply
CO5	Gain knowledge about the applications of geology in projects such as dams, tunnels, bridges, roads, airport and harbor.	Knowledge/ Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	2	2	2				2	2	2	2	2	3
CO3	1		2				3	2	2	2	2	3
CO4		2	2		3		3	3	3	3	3	3
CO5	1		2	3		2	3	3	3	3	3	3

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	-	-	-
Create (Cr)	10	10	10

R2/ w.e.f. 03.01. 2024
Passed in BoS Meeting held on 22/11/23
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BoS Chairman

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS								R2022
60CE305 ENGINEERING GEOLOGY								
CIVIL ENGINEERING								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	2	40	60	100

PHYSICAL GEOLOGY* Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.	**[09]**
MINEROLOGY* Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.	**[09]**
PETROLOGY* 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.	**[09]**
STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS* Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.	**[09]**
APPLICATION OF GEOLOGICAL INVESTIGATIONS* Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.	**[09]**
Total Hours	**45**

Textbook(s):

1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.

Reference(s):

1. Muthiayya, V.D. " A Text of Geology", Oxford IBH Publications, Calcutta, 1969.
2. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3. Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
4. Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, New Delhi, 1988.

***SDG9 – Industry, Innovation and Infrastructure**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**PHYSICAL GEOLOGY**	
1.1	Geology in civil engineering	1
1.2	branches of geology	1
1.3	structure of earth and its composition	1
1.4	weathering of rocks and scale of weathering	1
1.5	soils - landforms and processes associated with river, wind, groundwater and sea	1
1.6	relevance to civil engineering	1
1.7	Plate tectonics	1
1.8	Earth quakes zones in India.	1
1.9	Seismic zones in India.	1
2	**MINEROLOGY**	
2.1	Physical properties of minerals – Quartz group	1
2.2	Physical properties of minerals – Feldspar group	1
2.3	Pyroxene - hypersthene and augite	1
2.4	Amphibole – hornblende	1
2.5	Mica – muscovite and biotite,	1
2.6	Calcite	1
2.7	Gypsum	1
2.8	Clay minerals	1
2.9	Clay minerals	1
3	**PETROLOGY**	
3.1	Classification of rocks	2
3.2	Distinction between Igneous, Sedimentary and Metamorphic rocks.	2
3.3	Engineering properties, distribution and uses of Granite and Dolerite.	1
3.4	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Basalt and Sandstone	1
3.5	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Limestone and Laterite	1
3.6	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Shale and Quartzite	1
3.7	Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses – Marble, Slate, Gneiss and Schist	1
4	**STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS**	
4.1	Geological maps – attitude of beds	1
4.2	Study of structures – folds	1
4.3	Study of structures – faults	1
4.4	Study of structures –joints	1
4.5	Relevance to civil engineering.	1
4.6	Geophysical methods – Seismic methods for subsurface investigations.	2
4.7	Geophysical methods – Electrical methods for subsurface investigations.	2
5	**APPLICATION OF GEOLOGICAL INVESTIGATIONS**	

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5.1	Remote sensing for civil engineering applications	1
5.2	Geological conditions - construction of Dams and Reservoirs.	2
5.3	Geological conditions - construction of Tunnels, and Road cuttings.	2
5.4	Hydrogeological investigations and mining - Coastal protection structures.	2
5.5	Investigation of Landslides causes and mitigation.	2
	Total	**45**

CourseDesigners

1. Mr.S.GUNASEKAR - gunasekar@ksrct.ac.in

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60CE3P1	Fluid Mechanics and Hydraulics Engineering Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objective

• To be able to verify the principles studied in theory by performing the experiments in lab.

• To reinforcing the basics of fluid mechanics and machinery by hands on experiment.

• To hands on experiments in calibration of flow meters.

• To evaluate the Performance characteristics of turbines.

• To evaluate the Performance characteristics of pumps.

Prerequisite

Engineering Mathematics, Physics and Fluid Mechanics.

Course Outcomes

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

CO1	Measure the flow in the open channels using orifice and notches.	Apply
CO2	Measure the flow in pipe section using orificemeter and venturimeter	Apply
CO3	Measure and compute the major and minor losses in Pipes.	Apply
CO4	Study the performance of different types of hydraulic Turbines.	Apply
CO5	Study the performance of different types of pumps	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2		2			2			
CO2	3	2	3	3		3			2			
CO3	3	3	2	3		2			3			
CO4	2	3	3	2		3			2			
CO5	2	3	3	3		2			2			
3- Strong;2-Medium;1-Some												

R2/ w.e.f. 03.01. 2024
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List of Experiments **

1. Determination of co-efficient of discharge for orifice (Constant head).
2. Determination of co-efficient of discharge for orifice (Variable head).
3. Flow measurement in open channel using notches.
4. Flow measurement in pipe using Venturimeter.
5. Flow measurement in pipe using Orifice meter.
6. Determination of frictional loss in pipes system.
7. Determination of minor losses in pipes system.
8. Study on performance characteristics of Pelton turbine.
9. Study on performance characteristics of Francis turbine.
10. Study on performance characteristics of Kaplan turbine.
11. Assessment on performance characteristics of Centrifugal pump.
12. Assessment on performance characteristics of Reciprocating pump.

TotalHours	**60**

Textbook(s):

1.	Bansal, R.K., "A text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi,2019
2.	Rajput, R.K., “A Text book of Fluid Mechanics and Hydraulic Machines”, S. Chand Publishing Ltd., NewDelhi, 2015.
3.	Virtual Lab – Demonstration Videos

Reference(s):

1.	Modi, P.N. and Seth, S.M., "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House, New Delhi, 2015.
2.	Subramanian, K., “Fluid Mechanics and Hydraulic Machines – Problems and Solutions”, Tata McGraw Hill Education, New Delhi, 2010.
3.	Giles, R.V., Evett, J.B. & Liu, C., “Fluid Mechanics and Hydraulics”, Tata McGraw Hill, New Delhi, 2015.
4.	R.S.Khurmi, “Fluid mechanics& hydraulic Machines. (in S.I. units)” S CHAND & Company Limited, 2015.

****SDG7 – Affordable and Clean Energy**

CourseDesigners

Dr.M.VELUMANI-velumani@ksrct.ac.in

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TIRUCHENGODE - 637 215

60CE3P2	Surveying Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objective

- To Measure the surveying quantities Length, Area and Volume.
- To Learn the horizontal and vertical angle measurements using compass and theodolite.
- To get practice on Graphical surveying by practicing of Plane table surveying.
- To make aware the concept leveling in surveying and contour making.
- To handle the digital surveying instruments GPS and Total station.

Prerequisite

Engineering Mathematics, Surveying.

Course Outcomes

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

CO1	CO1: Familiar to chaining, ranging and apply it to take the angular measurement and Identify local attraction and appropriate methods to rectify it.	Apply
CO2	Calculate the irregular traverse area using Plane table methods, Collect the level of different points and calculate the reduced level of the respective points by appropriate methods.	Apply
CO3	Apply the lens principle to find the tachometric constants. Setting out of curve by linear and angular methods and trigonometric leveling.	Apply
CO4	Identify the ground co-ordinates with elevation of earth surface points with help of GPS and Calculate the area and volume using total station.	Apply
CO5	Explain Aerial photo Interpretation through stereo model creation with help of provided aerial photographs	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2		2			2			
CO2	3	2	3	3		3			2			
CO3	3	3	2	3		2			3			
CO4	2	3	3	2		3			2			
CO5	2	3	3	3		2			2			
3- Strong;2-Medium;1-Some												

K. S. Rangasamy College of Technology–Autonomous R2022	
60 CE 3P2 -Surveying Laboratory	
Civil Engineering	
List of Experiments 1. Calculate the area of given irregular boundary using conventional chain and accasories. 2. Establish the compass traverse, introduce the correction for local attraction and calculate the area for the same. 3. Calculate the area for the given irregular polygon by conducting plane table surveying methods. 4. Find the elevation differences of the given area through finding the RL value of given points by height of the Instrument method and Rise & fall method. 5. Apprise the gradient of the given land / topography through field observation. 6. Determine the tachometric constant of the analytical lens fixed transit theodolite 7. Assess the horizontal and vertical angles of given points for transit. 8. Prepare the calculation for setting out of circular curve and execute the same in the ground uning instrument. 9. Record fiend data using GPS and prepare contour map using software. 10. Practice on Total station **11.** Calculate the area and volume using total station on under prism mode	
Total Hours	**60**
Lab Manual prepared by KSRCT Faculties	

CourseDesigners

Dr.R.Jagadeesan – jagadeesan@ksrct.ac.in

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60 CG 0P2	Career Skill Development - II	Category	L	T	P	Credit
		CG	0	0	2	0

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

Basic knowledge of reading and writing in English.

Course Outcomes

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

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1								2	3	3	2	3		
CO2								2	3	3	2	3	2	
CO3								2	3	3	2	3	2	2
CO4								2	3	3	2	3		
CO5								2	3	3	2	3	2	2
3- Strong;2-Medium;1-Some														

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests(Marks)			End Semester Examination(Marks)
	1	2	Model	
Remember	10	10	20	No End Semester Examination
Understand	10	10	20	
Apply	20	20	30	
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
60 CG 0P2- Career Skill Development II								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	0	0	2	25	0	100	--	100
Listening* Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects, documentaries depicting a technical problem and suggesting solutions - Listening to TED Talks.								[5]
Speaking* Marketing a product, persuasive speech techniques - Describing and discussing the reasons of accidents or disasters based on news reports, Group Discussion (based on case studies), presenting oral reports, Mini presentations on select topics with visual aids, participating in role plays, virtual interviews.								[5]
Reading* Reading advertisements, user manuals and brochures - longer technical texts– cause and effect essays, and letters / emails of complaint - Case Studies, excerpts from literary texts, news reports etc. - Company profiles, Statement of Purpose (SoPs).								[5]
Writing* Professional emails, Email etiquette - compare and contrast essay - Writing responses to complaints Precis writing, Summarizing and Plagiarism- Job / Internship application – Cover letter &								[5]
Verbal Ability II* Reading Comprehension (Inferential fillups) – Spotting Errors – Verbal Analogies – Theme Detection – Change of Voice – Change of Speech – One word substitution								[5]
							Total Hours	**25**

Text Book(s):

1.	*'English for Engineers & Technologists'* Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020
3.	Raman. Meenakshi, Sharma. Sangeeta, 'Professional English'. Oxford University Press. New Delhi. 2019
4.	Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003

Course Contents and Lecture Schedule

S. No	Topic	No. of Hours
1	**Listening**	
1.1	Evaluative Listening: Advertisements, Product Descriptions	1
1.2	Listening to longer technical talks and completing– gap filling exercises.	1
1.3	Listening technical information from podcasts	1
1.4	Listening to process/event descriptions to identify cause & effects and documentaries depicting a technical problem and suggesting solutions	1

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1.5	Listening to TED Talks	1
2	**Speaking**	
2.1	Marketing a product, persuasive speech techniques	1
2.2	Describing and discussing the reasons of accidents or disasters based on news reports,	1
2.3	Group Discussion (based on case studies)	1
2.4	Presenting oral reports, Mini presentations on select topics with visual aids	1
2.5	participating in role plays and virtual interviews	1
3	**Reading**	
3.1	Reading advertisements, user manuals and brochures	1
3.2	Reading - longer technical texts– cause and effect essays, and letters / emails of complaint	1
3.3	Case Studies, excerpts from literary texts, news reports etc.	1
3.4	Company profiles	1
3.5	Statement of Purpose (SoPs)	1
4	**Writing**	
4.1	Professional emails, Email etiquette	1
4.2	Compare and contrast essay	1
4.3	Writing responses to complaints	1
4.4	Precis writing, Summarizing and Plagiarism	1
4.5	Job / Internship application – Cover letter & Résumé	1
5	**Verbal Ability II**	
5.1	Reading Comprehension (Inferential fillups) and Theme Detection	1
5.2	Spotting Errors	1
5.3	Verbal Analogies	1
5.4	Change of Voice and Change of Speech	1
5.5	One word substitution	1
	Total	**25**

*** SDG- 04- Quality Education**

CourseDesigner

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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BoS Chairman

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

FOURTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE 401	Structural Analysis I	2	40	60	100	45	100
2	60 CE 402	Soil Mechanics	2	40	60	100	45	100
3	60 CE 403	Water Supply and Wastewater Engineering	2	40	60	100	45	100
4	60 CE 404	Concrete Technology	2	40	60	100	45	100
5	60 CE L*	Open Elective – I	2	40	60	100	45	100
6	60 MY 002	Universal Human Value (UHV)*	2	40	60	100	45	100
PRACTICAL								
8	60 CE 4P1	Building Planning and Drawing Laboratory	3	60	40	100	45	100
9	60 CE 4P2	Materials Testing Laboratory	3	60	40	100	45	100
10	60 CG 0P3	Career Skill Development III	3	100	-	100	-	-
11	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60 CE 401	Structural Analysis I	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To introduce the students to basic theory and concepts of classical methods of structural analysis
- To understand the concept of stresses and strains
- To identify the best suitable method of analysis
- Analyse arches with different end conditions.
- To understand the behaviour of continuous beams subjected to different types of loadings.

.Prerequisite

Fundamentals of Mathematics, knowledge of properties of construction materials and its mechanics

CourseOutcomes

Onthesuccessful completion ofthecourse, students will beable to

CO1	Analyze the structures using the Energy principles concepts.	Analysis
CO2	Solve the problems in various arches with various loading condition.	Evaluate
CO3	Analysis the Beam, Trusses and frames using three moment equation.	Analysis
CO4	Analysis the Beam and rigid frames using slope deflection equation.	Analysis
CO5	Analysis the Beam and frames using moment distribution method.	Analysis

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	3	2	3	2	1	1		1	2
CO2	2	1	2	3	2	3	2	1	1		1	2
CO3	3	2	2	2	1	3		1	1		1	
CO4	2	2	1	2	3	3	2	1	1		1	2
CO5	1	2	1	1	3	3		1	1		1	
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	10	10	20
Analyse	10	10	20
Evaluate	10	10	10
Create	10	10	30

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TIRUCHENGODE - 637 215

K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE 401 - Structural Analysis I								
B.E.Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	1	0	60	4	40	60	100

Energy Principles *

Strain energy and strain energy density: strain energy in axial, shear, flexure and torsion – Principle of virtual work – Energy theorems – Castigliano's theorems, Maxwell's reciprocal theorem, Engessor's theorem – Application of energy theorems for computing deflections in beams and trusses.

[09]

Arches**

Analysis of three hinged and two hinged arches – parabolic and circular arches – Determination of Reaction, Normal thrust, Radial shear and Bending moment.

[09]

Theorem of three moments**

Static and kinematic Indeterminacy – Beams, Trusses and frames; Analysis of statically indeterminate structures – Theorem of three moments (Only two dimension).

[09]

Slope Deflection Method**

Continuous beams and rigid frames – symmetry and anti-symmetry loading – Deformed shape, Shear force and Bending moment diagram (Unknowns restricted to three only).

[09]

Moment Distribution Method**

Basic concepts –, stiffness, distribution and carry over factors – Analysis of continuous Beams – plane rigid frames with and without sway – Deflected shape, shear force and bending moment diagrams.

[09]

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book (s):

1. Thandavamoorthy, T.S. "Structural Analysis", Oxford University Press, New Delhi 2011.
2. Vaidyanadhan.R and Perumal.P, "Comprehensive structural Analysis – Vol.1 & Vol2", Laxmi Publications, New Delhi, 2010.

Reference (s) :

1. Ghali.A, Nebille, A.M. and Brown, T.G. "Structural Analysis" A unified classical and Matrix approach" – 5th edition. Spon press London and Newyork , 2009.
2. Hibbeler, R.C. "Structural Analysis" pearson Education (Singapore) Pvt. Ltd – Delhi – 110 092, 2009.
3. Rajesekaran, S. and Sankara Subramanian, G. "Computational structural mechanics, "Prentice Hall of India Pvt Ltd, New Delhi, 2001.
4. Vazrani.V.N And Ratwani, M.M, "Analysis of Structures, Vol.II", Khanna Publishers, 2015.

***SDG:4 Quality Education, **SDG:9: Industry, innovation and infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Energy Principles**	
1.1	Strain energy and strain energy density	1
1.2	Derivation in strain energy in axial, shear, flexure and torsion	1

R2/ w.e.f. 03.01.2024
Passed in the BOS Meeting Held on 21.11.2023
Approved in Academic Council Meeting held on 23/12/2023

BOS Chairman

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

1.3	Principle of virtual work	1
1.4	Derivation in Energy theorems	2
1.5	Problems using Castigliano's theorems, Maxwell's reciprocal theorem, Engessor's theorem	2
1.6	Application of energy theorems for computing deflections in beams and trusses	2
2	**Arches**	
2.1	Introduction to Arches, Types and applications	1
2.2	Derivation in three hinged arches	1
2.3	Problems in three hinged arches	2
2.4	Problems in three hinged arches	1
2.5	Derivation in two hinged arches	1
2.6	Problems in two hinged arches	1
2.7	Derivation in Parobolic arches	1
2.8	Problems in Parobolic arches	1
2.9	Problems in Circular arches	2
3	**Theorem of three moments**	
3.1	Static and kinematic Indeterminacy	2
3.2	Problem in finding Static and kinematic Indeterminacy for various beam	2
3.3	Problem in finding Static and kinematic Indeterminacy for various Truss	1
3.4	Analysis of statically indeterminate structures (Fixed Beam)	1
3.5	Analysis of statically indeterminate structures (Continuous Beam)	1
3.6	Analysis of statically indeterminate structures (Cantilever Beam)	1
3.7	Analysis of statically indeterminate structures (Truss)	1
4	**Slope Deflection Method**	
4.1	Derivation of Slope Deflection Equation	2
4.2	Calculating Fixed End Moments for various beams	1
4.3	Problems Using Slope Deflection method (Beam - Determinate)	1
4.4	Problems Using Slope Deflection method (Beam - Indeterminate)	1
4.5	Problems Using Slope Deflection method (2 D Frame- Determinate)	1
4.6	Problems Using Slope Deflection method (2 D Frame - Indeterminate)	1
4.8	Problems Using Slope Deflection method (3 D Frame- Determinate)	1
5	**Moment Distribution Method**	
5.1	Basic concepts	2
5.2	Stiffness, distribution and carry over factors	1
5.3	Problems Using Slope Deflection method (2 Span Beam)	1
5.4	Problems Using Slope Deflection method (Continuous Beam)	1

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5.5	Problems Using Slope Deflection method (2 Span Frame)	1
5.6	Problems Using Slope Deflection method (Portal Frame)	1
5.7	Problems Using Slope Deflection method (Space Frame)	2
	Total	**45**

CourseDesigners

1. Dr.K.VIJAYA SUNDRAVEL - vijayasundravel@ksrct.ac.in

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60CE402	Soil Mechanics	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To provide students with basic understanding of physical and mechanical properties of soil.
- To impart knowledge of basic index and engineering properties of soil
- To identify factors controlling soil behavior and methods to determine soil properties.
- To acquire basic knowledge in engineering design of geotechnical systems
- To Analyse the stability of slopes with protection measures

Prerequisite

Basic knowledge of properties learnt in Geology courses

CourseOutcomes

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

CO1	Impart the fundamental concepts of soil mechanics and identify the soil properties.	Knowledge/ Analyse/ Apply
CO2	Understand the importance engineering properties such as Consolidation and compaction of soils	Knowledge/ Analyse/ Apply
CO3	Understand the knowledge aspects of Shear strength	Knowledge/ Analyse/ Apply
CO4	Evaluate the stress developed in the soil medium	Knowledge/ Analyse/ Apply
CO5	Analyse the stability of slopes.	Knowledge/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	3	2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	2	2	3	2	3	2	2	2	2	3
CO4	3	2	2	3	3	2	3	3	3	3	3	3
CO5	3	2	2	3	3	2	3	3	3	3	3	3
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)		-	-

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60 CE 402 - Soil Mechanics								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	1	0	45	4	40	60	100

Soil Classification and Compaction* Nature of soil – phase relationships – Soil description and classification for engineering purposes- their significance – Index properties of soils - BIS Classification system; Soil compaction :Theory-comparison of laboratory and field compaction methods- Compaction – Proctor's test – Moisture – density relations -Factors influencing compaction behaviour of soils.	**[09]**
Effective Stress Principle and Permeability* Soil water :static pressure in water - Effective stress concepts in soils – capillary stress; Permeability measurement in the laboratory and field pumping in and pumping out tests – factors influencing permeability of soils; Seepage – Introduction to flow nets – Simple problems.	**[09]**
Stress Distribution Concept and Settlement ** Stress distribution - soil media – Boussinesq theory - Use of New marks influence chart; Settlement: Components of settlement –– immediate and consolidation settlement - Methods of minimising settlement – Terzaghi"s one dimensional consolidation theory – computation of rate of settlement – square root 't' and log t methods– e-log p relationship - Factors influencing compression behaviour of soils.	**[09]**
Shear Strength Behaviour of Soil ** Shear strength of cohesive and cohesionless soils – Mohr's and Coulomb's failure theory – Relationship between principal stresses at failure - Measurement of shear strength: Direct shear Test – Triaxial compression Test - Unconfined Compression Test and Vane shear Test; Pore pressure parameters: cyclic mobility – Liquefaction.	**[09]**
Stability of Slopes * Slope failure mechanisms – Types: infinite slopes – finite slopes; Total stress analysis for saturated clay – Fellenius method - Friction circle method; Factor of safety - use of stability number; Slope protection measures.	**[09]**
TotalHours	**45**

Textbook(s):

1.	Gopal Ranjan, "Basic and Applied Soil Mechanics" New Age International, New Delhi, 2022
2.	Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications, New Delhi, 2017.

Reference(s):

1.	Braja M. Das, "Principles of Geotechnical Engineering", Cengage learning Pvt. Ltd, 8th Edition, 2014.
2.	Holtz D. and Kovacs, W.D., "An Introduction to Geotechnical Engineering", Prentice Hall, 2nd Edition, 2011.
3.	Purshotam Raj,P. "Geotechnical Engineering", Tata McGraw Hill , 2013
4.	Alam Singh and Chowdhary, G.R., "Soil Engineering in Theory and Practice", Volume-2, Geotechnical testing and instrumentation, CBS Publishers and Distributors, New Delhi, 2014.

***SDG:4 – Quality Education**

****SDG:9 – Industry, Innovation and Infrastructure**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Soil Classification and Compaction**	
1.1	Nature of soil – phase relationships, Soil description	1
1.2	Classification for engineering purposes and their significance	1
1.3	Index properties of soils	1
1.4	Problems on Index properties of soils	1
1.5	BIS Classification system	1
1.6	Problems on Soil Classification	1
1.7	Soil compaction and Theory	1
1.8	Laboratory and field compaction methods	1
1.9	Field compaction methods	1
2	**Effective Stress Principle and Permeability**	
2.1	Soil water :static pressure in water	1
2.2	Effective stress concepts in soils	1
2.3	capillary stress	1
2.4	Permeability measurement in the laboratory	1
2.5	Permeability measurement field pumping in and pumping out tests	1
2.6	Factors influencing permeability of soils	1
2.7	Introduction to Seepage and flow nets	1
2.8	Problems in Seepage	1
2.9	Problems in flow nets	1
3	**Stress Distribution Concept and Settlement**	
3.1	Stress distribution - soil media	1
3.2	Boussinesq theory	2
3.3	Use of Newmarks influence chart	1
3.4	Settlement: Components of settlement	1
3.5	Immediate and consolidation settlement	1
3.6	Terzaghi"s one dimensional consolidation theory	1
3.7	Computation of rate of settlement, square root ‘t’ and log t methods	1
3.8	e-log p relationship and Factors influencing compression behaviour of soils	1
4	**Shear Strength Behaviour of Soil**	
4.1	Shear strength of cohesive and cohesion less soils	1
4.2	Mohr’s failure theory	1
4.3	Coulomb’s failure theory	1
4.4	Measurement of shear strength: Direct shear Test	1

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4.5	Triaxial compression Test	1
4.6	Unconfined Compression Test	2
4.7	Vane shear Test	1
4.8	Pore pressure parameters, Cyclic mobility – Liquefaction	1
5	**Stability of Slopes**	
5.1	Slope failure mechanisms	1
5.2	Types : infinite slopes and Finite slopes	2
5.3	Total stress analysis for saturated clay	1
5.4	Fellenius method	1
5.5	Friction circle method	1
5.6	Problems in Friction circle method and Factor of safety - use of stability number	2
5.7	Slope protection measures	1
		45

Course Designers

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60 CE 403	WATER SUPPLY AND WASTEWATER ENGINEERING	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the sources and conveyance of water supply system.
- To learn the principles of various water treatment processes.
- To gain knowledge on the sources, characteristics and conveyance of sewage.
- To know the principles of secondary treatment of sewage.
- To acquire knowledge on sewage disposal and sanitation systems.

Prerequisite

Basic knowledge on environmental science.
60 MY 001 - Environmental Studies and Climate Change.

Course Outcomes

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

CO1	Interpret the water demand and elements of water conveyance.	Remember, Understand, Apply
CO2	Describe the principles of water purification methods.	Remember, Understand, Apply
CO3	Report the quantity of waste water generated and it's transmitting.	Remember, Understand, Apply
CO4	Explain the principles of biological processes of sewage treatment.	Remember, Understand, Apply
CO5	Recognize appropriate sewage disposal methods and sanitation system.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2		1	3	3	3	1	2	1	3
CO2	3	2	2	2	1	3	3	3		2		3
CO3	3	3	2		1	3	3	3	1	2	1	3
CO4	3	2	3	2	1	3	3	3		2		3
CO5	3	2	3		1	3	3	3	1	2	1	3
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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60 CE 403 - Water Supply and Wastewater Engineering								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Water Supply, Source and Conveyance * Objectives - Water demand – Design period - Population forecasts - Sources of water - Water quality parameters and standards - Intake structures - Laying, jointing and testing of pipelines - Pipe appurtenances.	**[09]**
Principles of Water Treatment* Unit operations and processes - Principles and operation of Screens - Aeration - Sedimentation tanks – Coagulation and flocculation - Filters - Disinfection methods - Water softening methods.	**[09]**
Collection and Conveyance of Sewage** Sources and characteristics of wastewater - Dry weather flow - Storm runoff estimation - Minimum and Maximum velocity - Laying, jointing and testing of sewers - Sewer appurtenances.	**[09]**
Principles of Sewage Treatment** Basic principles of biological treatment - Principles and operation of Grit chamber - Trickling filter - Activated sludge process - Waste stabilization ponds - Layout of Sewage treatment plant - Septic tanks - Sludge treatment and disposal.	**[09]**
Sewage Disposal and Rural Sanitation* Sewage disposal - Self purification process - Oxygen sag curve - Sewage farming - House drainage - Sanitary fixtures - Systems of plumbing - Rural sanitation system - Environmental legislations.	**[09]**
TotalHours	**45**

Textbook(s):

1.	Garg S.K., “Environmental Engineering: Vol I & Vol II”, Khanna Publishers, New Delhi, 2022.
2.	Metcalf & Eddy, George Tchobanoglous, H. Stensel, Ryujiro Tsuchihashi and Franklin Burton, "Wastewater Engineering: Treatment and Resource Recovery", 5th Edition, McGraw-Hill, New Delhi, 2014.

Reference(s):

1.	Howard S. Peavy, Donald R. Rowe & George Tchobanoglous, “Environmental Engineering”, McGraw-Hill, New Delhi, 2017.
2.	Punmia B.C., Jain A.K. & Jain A.K., “Environmental Engineering - I & II”, 2nd Edition, Laxmi Publications, New Delhi, 2022.
3.	CPHEEO, “Manual on Operation and Maintenance of Water Supply Systems”, Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi, 2005.
4.	CPHEEO, “Manual on Sewerage and Sewage Treatment Systems”, Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi, 2005.

*** SDG 6 – Clean Water and Sanitation, SDG 11 – Sustainable Cities and Communities**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Water Supply, Source and Conveyance**	**9**
1.1	Introduction & objectives	1

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1.2	Water demand	1
1.3	Design period	1
1.4	Population forecasts	1
1.5	Sources of water	1
1.6	Water quality parameters and standards	1
1.7	Intake structures	1
1.8	Laying, jointing and testing of pipelines	1
1.9	Pipe appurtenances	1
2	**Principles of Water Treatment**	**9**
2.1	Unit operations and processes	1
2.2	Screens	1
2.3	Aeration	1
2.4	Sedimentation tanks	1
2.5	Coagulation and flocculation	1
2.6	Filters	2
2.7	Disinfection methods	1
2.8	Water Softening Methods	1
3	**Collection and Conveyance of Sewage**	**9**
3.1	Sources of sewage	1
3.2	characteristics of sewage	1
3.3	Dry weather flow	1
3.4	Storm runoff estimation	2
3.5	Minimum and Maximum velocity	1
3.6	Laying, jointing and testing of sewers	1
3.7	Sewer appurtenances	2
4	**Principles of Sewage Treatment**	**9**
4.1	Basic principles of biological treatment	1
4.2	Grit Chamber	1
4.3	Trickling filter	1
4.4	Activated sludge process	1
4.5	Waste stabilization ponds	1
4.6	Layout of Sewage treatment plant	1
4.7	Septic tanks	1
4.8	Sludge treatment and disposal	2
5	**Sewage Disposal and Rural Sanitation**	**9**
5.1	Sewage disposal	1
5.2	Self purification process	1
5.3	Oxygen sag curve	1
5.4	Sewage farming	1
5.5	House drainage	1

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5.6	Sanitary fixtures	1
5.7	Systems of plumbing	1
5.8	Rural sanitation system	1
5.9	Environmental legislations	1
	Total	**45**

CourseDesigners

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60CE404	CONCRETE TECHNOLOGY	Category	L	T	P	Credit
		PC	3	0	0	3

Objective

- To acquire knowledge about the properties of concrete making materials
- To perform concrete mix design using IS and ACI methods
- To learn fresh and hardened properties of concrete
- To gain knowledge in manufacture and special concreting methods
- To understand the properties of materials used for making special concrete and its applications

Prerequisite

Construction Materials and Practices

Course Outcomes

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

CO1	Learn the properties of concrete making materials	Remember/ Understand Analyse/ Apply
CO2	Design Concrete mix as per IS and ACI codes	Remember/ Understand Analyse/ Apply
CO3	Perform various test on fresh and hardened concrete	Remember/ Understand Analyse/ Apply
CO4	Outline the manufacturing process of concrete and special concreting methods	Remember/ Understand Analyse/ Apply
CO5	Apply special concrete in construction practices	Remember/ Understand Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	3	2	2	2	2	3
CO2	3	3	3	3	3	3	2	2	2	2	2	2
CO3	3	3	3	3	3	2	3	2	2	2	2	3
CO4	3	3	3	3	2	3	3	2	2	2	2	2
CO5	3	3	3	3	2	3	3	2	2	2	2	2

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous R 2022								
60CE404 - Concrete Technology								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Concrete Making Materials* Cement: Chemical composition and Properties – Hydration of cement - Test on cement – IS Specifications - Gel-Space ratio - Abraham's law, Aggregates: Classification and Tests as per BIS Specification - Alkali aggregate reaction - Water: Quality of water for use in concrete, Admixtures: Their effects on concrete properties.	**[10]**
Mix Design* Principles of concrete mix design - factors influencing mix design - Nominal and Design mix - IS and ACI Method of concrete mix design.	**[07]**
Properties of Concrete* Fresh Concrete: Workability - Factors affecting workability & Measurement of workability - Hardened Concrete - Compressive Strength, Split tensile strength, Flexural Strength , Stress-Strain Curve for concrete - Modulus of elasticity - Durability Properties - Water absorption, permeability and acid resistance.	**[09]**
Concrete Manufacture & Methods** Concrete: manufacturing Process - Batching, Mixing, Transporting, Placing, Compacting and Curing - Special concreting methods : Ready Mix Concrete, Vacuum dewatering, Underwater concrete - Cold and Hot weather Concreting.	**[10]**
Special Concretes* Properties and Applications : Light weight concrete (Artificial aggregates) - Ferro-cement - Fiber reinforced concrete - Polymer Concrete - Air entrained concrete - High performance concrete - High strength concrete - Self compacting concrete - Self curing concrete and Geo-polymer concrete.	**[09]**
Total Hours	**45**

Textbook(s):

1. Shetty, M.S., "Concrete Technology", S.Chand and Company Ltd., Delhi, 2018.
2. Santhakumar, A.R., "Concrete Technology", Oxford University Press, New Delhi, 2018.

Reference(s):

1. Neville, A.M., "Properties of Concrete" , 5th Edition, John Wiley & Sons (Asia) Pvt. Ltd., 2011.
2. Gambhir, M.L., "Concrete Technology", Tata McGraw Hill Company Ltd., Delhi, 2014.
3. M.S.Shetty, A.K.Jain, "Concrete Technology: Theory and Practice", S.Chand Publishing, 2018.
4. J.J. Brooks A. M. Neville, "Concrete Technology", Pearson Education, 2019.

***SDG9 – Industry, Innovation and Infrastructure**
****SDG12 – Responsible Consumption and Production**

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Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Concrete Making Materials**	
1.1	Introduction to the course & concrete making materials	1
1.2	Cement: Chemical composition and Properties – Hydration of cement	1
1.3	Various Test on cement	2
1.4	Gel space ratio, Abrahams law and Classification of aggregates	1
1.5	Various test on aggregates and Alkali Aggregate reaction	2
1.6	Water quality parameters and their impact on concrete	1
1.7	Mineral admixtures	1
1.8	Chemical admixtures	1
2	**Mix Design**	
2.1	Principles of concrete mix design	1
2.2	Factors influencing mix design & Nominal and design mix - Differences	1
2.3	IS Method of mix design - Procedure	1
2.4	IS Method of mix design - Problem	2
2.5	ACI Method of mix design - Procedure	1
2.6	ACI Method of mix design - Problem	1
3	**Properties of Concrete**	
3.1	Workability and factors affecting workability	1
3.2	Slump cone and Vee bee consistometer test	1
3.3	Compaction factor and Flow table test	1
3.4	Compressive Strength and Split tensile strength	2
3.5	Flexural Strength , Stress-Strain Curve for concrete - Modulus of elasticity	2
3.6	Durability Properties - Water absorption & Permeability	1
3.7	Durability Properties – Acid resistance	1
4	**Concreting Manufacture & Methods**	
4.1	Manufacturing Process – Batching & Mixing of concrete	2
4.2	Transporting & Placing of concrete	2
4.3	Compacting & Curing of concrete	2
4.4	Ready Mix Concrete	1
4.5	Vacuum dewatering	1
4.6	Underwater concrete	1
4.7	Cold and Hot weather Concreting	1
5	**Special Concretes**	

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5.1	Properties and Applications - Lightweight concrete using Artificial aggregates	1
5.2	Ferro-cement	1
5.3	Fiber reinforced concrete	1
5.4	Polymer Concrete	1
5.5	Air entrained concrete	1
5.6	High performance concrete &High strength concrete	1
5.7	Self compacting concrete	1
5.8	Self curing concrete	1
5.9	Geo-polymer concrete	1
	Total	**45**

CourseDesigners

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60CE4P1	BUILDING PLANNING AND DRAFTING LABORATORY	Category	L	T	P	Credit
		PC	0	0	4	2

Objective

- Achieve skill sets to prepare computer aided engineering drawings.
- Understand the details of construction of different building elements.
- Visualize the completed form of the building and the intricacies of construction based on the engineering drawings.

Prerequisite

Basic knowledge on CADD Software.

CourseOutcomes

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

CO1	Understand about various tools and commands in AUTO CADD Software.	Knowledge
CO2	Develop any type of building drawing using CADD software.	Apply
CO3	Create layout plan, sanction drawings, working drawings using CADD software.	Apply
CO4	Sketch sectional view and elevation for different buildings.	Apply
CO5	Draw the various building components and also other structural Components.	Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	2	2	2								1	
CO3	1		2					3				
CO4		2	2		3							
CO5	1		2	3		2	3	3	3	3	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)			40
Apply (Ap)			40
Analyse (An)			-
Create (Cr)			20

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS								R2022
60CE4P1 - BUILDING PLANNING AND DRAFTING LABORATORY								
CIVIL ENGINEERING								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100

1. Introduction about AUTOCADD Software - Basics commands*****.
2. Preparation of key plan and site plan. *****
3. Drawings of Building Components*****.
4. Plan, Section and Elevation of a Load bearing structure. *****
5. Plan, Section and Elevation of a framed structure. *****
6. Plan, Section and Elevation of a Library building. *****
7. Plan, Section and Elevation of a primary school building. *****
8. Plan, Section and Elevation of a primary health care Centre. *****
9. Preparation of Plumbing, wiring, Water supply and sanitary facilities of a building. *****
10. Conversion of 2D plan into 3D plan using REVIT Software (Project). *****

Total Hours **60**

Textbook(s):

1.	SeshaPraksh, M.N. & Dr.Servesh, G.S.'' Computer Aided Design Laboratory'' Laxmi Publications, NewDelhi – 2016.
2.	P.J. Sha '' Engineering Graphics'' S.Chand& Co., New Delhi – 2015.

Reference(s):

1.	Dr.M.A.Jayaram, D.S.Rajendra Prasad,'' CAD in Civil Engineering a Laboratory Referrel'' Sapna Book House, Chennai – 2014.
2.	Shah M G,'' Building Drawing'' Tata McGraw – Hill, New Delhi – 1992.
3.	Kumaraswamy N., Kameswara Rao A.'' Building Planning & Drawing'' Charotar Publishing, New Delhi, 2015.
4.	Shah, Kale and Patki,''Building Drawing with integrated approach to environment'' Tata McGraw – Hill, 2012.

***SDG9 – Industry, Innovation and Infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	Introduction to AUTO CADD Software.	04
2	Preparation of key plan and site plan.	04
3	Drawings of Building Components.	04

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4	Plan, Section and Elevation of a Load bearing structure.	08
5	Plan, Section and Elevation of a framed structure.	08
6	Plan, Section and Elevation of a Library building.	08
7	Plan, Section and Elevation of a primary school building.	08
8	Plan, Section and Elevation of a primary health care Centre.	08
9	Preparation of Plumbing, wiring, Water supply and sanitary facilities.	06
10	Conversion of 2D into 3D using REVIT Software.	02
	Total	60

CourseDesigners

1. Mr.S.GUNASEKAR - gunasekar@ksrct.ac.in

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60CE4P2	Materials Testing Laboratory

Category	L	T	P	Credit
PC	0	0	4	2

Objectives

- To acquire knowledge on properties of bricks
- To gain knowledge on basic properties of cement
- To impart knowledge on the test of fine aggregates
- To understand the test on coarse aggregates
- To learn the various test on metal specimen

Pre-requisite

Courses – Construction Materials & Practices

Course Outcomes

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

CO1	Experiment the various test on bricks	Apply
CO2	Perform various test for cement	Apply
CO3	Demonstrate the different test available for fine aggregates	Apply
CO4	Comprehend the properties of coarse aggregates	Apply
CO5	Identify the test available for testing metal specimen	Apply

Mapping with Programme outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	3	3	2	3	2	2	2
CO2	3	2	3	3	2	3	3	2	3	2	2	2
CO3	3	2	2	3	2	2	2	2	3	2	2	2
CO4	3	2	2	3	2	2	2	2	3	2	2	2
CO5	3	2	2	3	2	2	2	2	3	2	2	2
3- Strong; 2-Medium; 1-Low												

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List of Experiments

1. Determine the properties of brick*****
2. Determine the properties of cement*****
3. Determine the properties of fine aggregate*****
4. Determine the properties of coarse aggregate*****
5. Perform the tension test on mild steel rod specimen*****
6. Determine the impact resistance of mild steel specimen*****
7. Determine the hardness number for the given specimen*****
8. Perform the bending test on beam specimen*****

***SDG9 – Industry, Innovation and Infrastructure**

Reference(s)	
1.	IS 3495 - Part 1 to 4 - Methods of tests of burnt clay building bricks – BIS, New Delhi
2.	IS 12269 : 2013 - Ordinary Portland Cement 53 Grade – Specification BIS, New Delhi
3.	IS 383 – 2016, Coarse and Fine Aggregate for Concrete - Specification (Third Revision)

Course Designers

1. Mr.K.ANGU SENTHIL - angusenthil@ksrct.ac.in

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60 CG 0P3	CAREER SKILL DEVELOPMENT - III	Category	L	T	P	Credit
		CG	0	0	2	1*

Objective

- To help learners improve their logical reasoning skillsat different academic and professional contexts.
- To help learners relatebasic quantitative problems and solve them.
- To help learnersInfer critically the statements with optimal conclusions and assumptions.
- To Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively
- To compute quantitative problems related to time and work, speed and distance, and simple and compound interest

Prerequisite

Basic knowledge of Arithmetic and Logical Reasoning

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Deduce the topics in logical reasoning at the preliminary and intermediate level.	Analyze
CO2	Relate basic quantitative problems and solve them effectively at the preliminary level	Apply
CO3	Infer critically the statements with optimal conclusions and assumptions with the data and information given.	Analyze
CO4	Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively at the pre-intermediate level.	Apply
CO5	Compute quantitative problems related to time and work, speed and distance, and simple and compound interest at intermediate level.	Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2	2	3		3				2	3	3	3	
CO2	3	3	3	3		2				2	3	3	3	2
CO3	2	2	2	2		3				2	3	3	3	1
CO4	3	3	3	3		2				2	3	3	2	2
CO5	3	3	3	3		2				2	3	3	3	3
3- Strong;2-Medium;1-Some														

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
Career Skill Development III								
Common to All Branches								
Semester	Hours/Week			TotalHrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
IV	0	0	2	25	0	100	00	100

Logical Reasoning Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Blood Relations - Coded Relations - Order and Ranking – odd man out - Direction and distance	**[5]**
Quantitative Aptitude – Part 1 Number system - Squares & cubes - Divisibility - Unit digits - Remainder Theorem - HCF & LCM - Geometric and Arithmetic progression - Surds & indices	**[5]**
Critical Reasoning Syllogism - Statements and Conclusions, Cause and Effect, Statements and Assumptions - identifying Strong Arguments and Weak Arguments – Cause and Action -Data sufficiency	**[5]**
Quantitative Aptitude – Part 2 Average - Ratio and proportion – Ages – Partnership– Percentage - Profit & loss – Discount - Mixture and Allegation	**[5]**
Quantitative Aptitude – Part 3 Time &Work - Pipes and cistern – Time, Speed & distance - Trains - Boats and Streams - Simple interest and Compound interest	**[5]**
TotalHours	**25**

Reference(s):

1. Aggarwal, R.S. *'A Modern Approach to Verbal and Non-verbal Reasoning'*, Revised Edition 2008,Reprint 2009,S.Chand& Co Ltd., New Delhi.
2. Abhijit Guha, *'Quantitative Aptitude'*, McGraw Hill Education, 6th edition, 2016
3. Dinesh Khattar,'Quantitative Aptitude For Competitive Examinations', Pearson Education 2020
4. Anne Thomson, *'Critical Reasoning: A Practical Introduction'*Lexicon Books, 3rd edition,2022.Warszaw

SDG 4 – Quality Education
SDG 8 – Decent work and Economic growth
SDG 9 – Industry, innovation and Infrastructure

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CourseContentsandLectureSchedule

S.No	Topic	No.of Hours	Mode of content Delivery
1	**Logical Reasoning**		
1.1	Analogies - Alpha and numeric series	1	Chalk& Board
1.2	Number Series - Coding and Decoding	1	Chalk & Board
1.3	Blood Relations - Coded Relations	1	Chalk & Board
1.4	Order and Ranking – odd man out	1	Chalk & Board
1.5	Direction and distance	1	Chalk & Board
2	**Quantitative Aptitude – Part 1**		
2.1	Number system	1	Chalk & Board
2.2	Squares & cubes - Divisibility	1	Chalk & Board
2.3	Unit digits - Remainder Theorem	1	Chalk & Board
2.4	HCF & LCM- Geometric and Arithmetic progression	1	Chalk & Board
2.5	Surds & indices	1	Chalk & Board
3	**Critical Reasoning**		
3.1	Syllogism	1	Chalk & Board
3.2	Statements and Conclusions, Cause and Effect	1	Chalk & Board
3.3	Statements and Assumptions	1	Chalk & Board
3.4	identifying Strong Arguments and Weak Arguments	1	Chalk & Board
3.5	Cause and Action -Data sufficiency	1	Chalk & Board
4	**Quantitative Aptitude – Part 2**		
4.1	Average - Ratio and proportion	1	Chalk & Board
4.2	Ages – Partnership	1	Chalk & Board
4.3	Percentage	1	Chalk & Board
4.4	Profit & loss	1	Chalk & Board
4.5	Discount - Mixture and Allegation	1	Chalk & Board
5	**Quantitative Aptitude – Part 3**		
5.1	Time & Work	1	Chalk & Board
5.2	Pipes and cistern	1	Chalk & Board
5.3	Time, Speed & distance - Trains	1	Chalk &Board
5.4	Boats and Streams	1	Chalk & Board
5.5	Simple interest and Compound interest	1	Chalk & Board
	Total	**25**	

CourseDesigner

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TIRUCHENGODE - 637 215

60 AB 001	National Cadet Corps- AIR WING	Category	L	T	P	Credit
		HS	2	0	2	3

Objective

- To designed especially for NCC Cadets
- To develop character,camaraderie,discipline, secular outlook
- To inculcate spirit of adventure,sportsman spirit
- To teach selfless service amongst cadets by working in teams
- To learning military subjects including weapon training and motivate them to join in tri-services

Prerequisite

Nil

Course Outcomes

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

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion	Knowledge
CO2	Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling	Knowledge
CO3	Illustrate various forces and moments acting on aircraft	Apply
CO4	Outline the concepts of aircraft engine and rocket propulsion	Apply
CO5	Design, build and fly chuck gliders/model airplanes and display static models	Apply

Mapping with Programme Outcomes

Mapping of Cos with Pos and PSOs														
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1						3	3	3	3	3				
CO2					3									
CO3	3	2	1	1										
CO4	3	2	1	1										
CO5	3	2	1	1										
1–Slight,2–Moderate,3–Substantial,BT-Bloom"sTaxonomy														

Assessment Pattern

Bloom'sCategory	ContinuousAssessment(Marks)			End Sem Examination (Marks)
	DST(20)	AM(20)	SBM(10)	
Knowledge (Kn)	10	10	00	40
Apply (Ap)	10	10	10	60
Analyse (An)				00
Create (Cr)				00

DST - Drill SquareTest AM - Aero Modeling SBM - Swachh Bharat Mission

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 AB 001 - NCC AIR WING								
Common to ALL Branches								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	0	2	45	3	50	50	100

Objective(s)	• TodesignedespeciallyforNCCCadets • To developcharacter,camaraderie,discipline, secularoutlook • To inculcate spiritofadventure,sportsmanspirit • To teach selflessserviceamongstcadetsbyworkinginteams • To learning militarysubjectsincludingweapontraining and motivate them to join in tri-services
Course Outcomes	**At the end of the course, the student will be able to** **CO1:**Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion. **CO2:** Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling **CO3:** Illustrate various forces and moments acting on aircraft **CO4:** Outline the concepts of aircraft engine and rocket propulsion **CO5:** Design, build and fly chuck gliders/model airplanes and display static models.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hoursindicated.

NCCOrganisationandNationalIntegration NCC Organization — History of NCC- NCC Organization- NCC Training- NCC Uniform — Promotion of NCC cadets — Aim andadvantages of NCC Training- NCC badges of Rank- Honors" and Awards – Incentives for NCC cadets by central and state govt. HistoryandOrganizationofIAF- Indo-PakWar-1971-OperationSafedSagar.NationalIntegration-Unityindiversity- Contributionofyouthin nationbuilding-Nationalintegrationcouncil-ImagesandSlogansonNationalIntegration.	[9]
DrillandWeaponTraining Basic physical Training- Various exercises for fitness(with Demonstration)- Food- Hygiene and Cleanliness.Drill-Wordsofcommands- Position and commands- Sizing and forming- Saluting- Marching-Turning on the march and wheeling- Saluting on themarch-Sidepace,Paceforwardandtotherear-Markingtime-Drillwitharms-Ceremonialdrill-Guardmounting.(WITH DEMONSTRATION)	[9]
PrinciplesofFlight Laws of motion-Forces acting on aircraft- Bernoulli"s theorem-Stalling-Primary control surfaces- Secondary control surfaces-Aircraft recognition.	[9]
AeroEngines Introduction of Aero engine-Types of engine- Piston engine- Jet engines-Turboprop engines-Basic Flight Instruments-Modern trends.	[9]
AeroModeling History of Aero modeling-Materials used in Aeromodeling-Types of Aeromodels – Static Models-Gliders-Control line models-Radio Control Models-Building and Flying of Aeromodels.	[9]
Total Hours	45

Text Books:

1.	"NationalCadetCorps- AConcisehandbookofNCCCadets", RameshPublishing House,NewDelhi,2014.

Reference(s):

1.	"CadetsHandbook–CommonSubjectsSD/SW",publishedbyDGNCC,New Delhi.
2.	"CadetsHandbook-SpecializedSubjects SD/SW",publishedbyDGNCC,NewDelhi.
3.	"NCCOTA Precise", publishedbyDGNCC, NewDelhi.

ESE	The examination and award of marks will be done by the Ministry of Defence, Government of India whichincludes all K1 to K4 knowledge levels. The maximum marks for the End Semester Examination is 500 marks. Itwillbeconverted to100 marks.

Course Designers

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60 AB 002	National Cadet Corps - Army Wing	Category	L	T	P	Credit
		HS	2	0	2	3

Objective

- Develop character, camaraderie
- Inculcate discipline, secular outlook
- Enrich the spirit of adventure, sportsman spirit
- Ideals of selfless service amongst cadets by working in teams
- Improve qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets.

Prerequisite

NIL

Course Outcomes

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

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion.	Apply
CO2	Demonstrate Health Exercises, the sense of discipline, improve bearing, smartness, turnout, develop the quality of immediate and implicit obedience of orders.	Apply
CO3	Basic knowledge of weapons and their use and handling.	Understand
CO4	Aware about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils	Apply
CO5	Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1		3				
CO2								2				
CO3						1		3				
CO4								2				
CO5								3				
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests(Marks)		End Sem Examination(Marks)
	1	2	
Remember	10	10	30
Understand	20	20	30
Apply	20	20	30
Analyse	10	10	10
Evaluate	0	0	0
Create	0	0	0

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Syllabus

60 AB 002 – National Cadet Corps (Army Wing)

Common to all Branches

Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
IV	2	0	2	45	3	50	50	100

NCC Organization & National Integration NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training- NCC badges of Rank- Honors' and Awards – Incentives for NCC cadets by central and state govt. National Integration - Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration	[09]
Basic Physical Training & Drill Basic physical Training – various exercises for fitness(with Demonstration)-Food – Hygiene and Cleanliness.Drill- Words of commands- position and commands- sizing and forming- saluting- marching- turning on the march and wheeling- saluting on the march- side pace, pace forward and to the rear- marking time- Drill with arms- ceremonial drill- guard mounting.(WITH DEMONSTRATION).	[09]
Weapon Training Main Parts of a Rifle- Characteristics of .303 rifle- Characteristics of .22 rifle- loading and unloading – position and holdingsafety precautions – range procedure- MPI and Elevation- Group and Snap shooting- Long/Short range firing(WITH PRACTICE SESSION) - Characteristics of 5.56mm rifle- Characteristics of 7.62mm SLR-LMG- carbine machine gun – pistol.	[09]
Social Awareness and Community Development Aims of Social service-Various Means and ways of social services- family planning – HIV and AIDS- Cancer its causes and preventive measures- NGO and their activities- Drug trafficking- Rural development programmes - MGNREGA-SGSYJGSY-NSAP-PMGSY-Terrorism and counter terrorism- Corruption – female foeticide -dowry –child abuse-RTI Act- RTE Act- Protection of children from sexual offences act- civic sense and responsibility	[09]
Specialized Subject (ARMY) Basic structure of Armed Forces- Military History – War heroes- battles of Indo-Pak war- Param Vir Chakra- Career in the Defence forces- Service tests and interviews.	[09]
TotalHours	**45**

TextBook(s):

1.	National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014
2.	Cadets Handbook- Specialized Subjects SD/SW published by DG NCC, New Delhi ,2014

Reference(s):

1.	"Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi,2019
2.	"Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi,2017

Course Designer

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

FIFTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE 501	Structural Analysis II	2	40	60	100	45	100
2	60 CE 502	Foundation Engineering	2	40	60	100	45	100
3	60 CE 503	Basic Reinforced Concrete Design	2	40	60	100	45	100
4	60 CE 504	Highway, Railway and Airport Engineering	2	40	60	100	45	100
5	60 CE E*	Professional Elective I	2	40	60	100	45	100
6	60 MY 003	Start-ups and Entrepreneurship	-	-	-	100	-	100
PRACTICAL								
8	60 CE 5P1	Geotechnical Engineering Laboratory	3	60	40	100	45	100
9	60 CE 5P2	Environmental Engineering Laboratory	3	60	40	100	45	100
10	60 CG 0P4	Career Skill Development - IV	-	100	-	100	-	-
11	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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60CE501	Structural Analysis - II	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To learn the plastic analysis of structures
- To gain knowledge on the influence line concepts for moving loads
- To Analyse the beams and frames using matrix flexibility method.
- To understand the concepts of Analysis using matrix stiffness method.
- To learn basics about Finite Element Method.

.Prerequisite

Fundamentals of Mathematics, knowledge of mechanics, Strength of Materials and Structural Analysis I

Course Outcomes

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

CO1	Examine the indeterminate beams and frames by using plastic theory.	Remember/ Understand/ Analyse/Apply
CO2	Apply Muller Breslau's principle for drawing Influence line diagram for reactions, Shear force and bending moment for indeterminate structures.	Remember/ Understand/ Analyse/Apply
CO3	Analyse the beams and rigid frames using matrix flexibility method.	Remember/ Understand/ Analyse/Apply
CO4	Determine the shear force and bending moment diagrams for the beams and rigid frames using matrix Stiffness method.	Remember/ Understand/ Analyse/Apply
CO5	Apply the finite element method to structural analysis.	Remember/ Understand/ Analyse/Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	3	2	3	3	2	3	3
CO2	3	3	3	2	2	3	3	3	3	2	3	3
CO3	3	3	3	2	2	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	10	10	15
Understand	10	10	15
Apply	10	10	30
Analyse	10	10	30
Evaluate	10	10	10
Create	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE 501 - Structural Analysis II								
B.E.Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

Plastic Analysis of Structures *

Plastic moment of resistance – shape factor – Load factor – plastic hinge and mechanism – plastic analysis of Indeterminate beams and frames (Single bay and single storey) – Applications of upper and lower bound theorems. **[09]**

Moving loads and Influence lines

Moving loads in Influence line diagram (ILD) – Load categories: Single concentrated load- Two concentrated loads- UDL shorter and longer than the span – Multiple wheel loads; Influence lines for statically determinate structures – Applications of Muller Breslau's principle.(Indeterminate structures upto 2 degrees of freedom). **[09]**

Matrix Flexibility Method*

Basic concepts of flexibility method: Equilibrium and compatibility equation – Primary structure – compatibility conditions; Analysis of indeterminate structures - continuous beams, rigid jointed plane frames (with redundancy restricted to two) – Shear force and bending moment diagrams**.** **[09]**

Matrix Stiffness Method *

Basic concepts of stiffness method: Element and global stiffness matrices – co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors; Analysis of pin – jointed plane frames and rigid frames (with redundancy restricted up to two) – Shear force and bending moment diagrams. **[09]**

Introduction to Finite Element Method *

Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain - Triangular elements (Concept Only) **[09]**

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book (s):

1. R Vaidyanadhan and P Perumal, "Comprehensive structural Analysis – Vol.1 & Vol2", Laxmi Publications, New Delhi, 2016.
2. T S Thandavamoorthy, "Structural Analysis" Oxford University Press, New Delhi, 2011.

Reference (s) :

1. S Rajesekaran and G Sankara Subramanian,"Computational structural mechanics" Prentice Hall of India Pvt Ltd, New Delhi, 2004.
2. A Ghali, A M Nebille and T G Brown, "Structural Analysis - A unified classical and Matrix approach" Spon press Ed fifth, London and Newyork, 2009.
3. M K Manickaselvam, "Elements of Matrix And Stability Analysis of Structures", Khanna Publishers, New Delhi, 2004.
4. S Senthil and Panneerdhass, "Finite Element Analysis" Lakshmi Publications, Chennai, 2017.

***SDG9 – Industry Innovation and Infrastructure**

List of MAT Lab Programmes

1. Determination of Plastic hinges and moments using MAT Lab
2. Analysis of the ILD using MAT Lab
3. Determination of Matrix (nxn) using MAT Lab
4. Determination of Eigen value and Eigen vector by using MAT Lab
5. Determination of stiffness matrix for beams, truss using MAT Lab

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**PLASTIC ANALYSIS OF STRUCTURES**	
1.1	Introduction to Plastic Analysis	1
1.2	Ductility and ultimate load	1
1.3	Plastic hinges and its mechanism	1
1.4	Elastic section modulus and Plastic section modulus	1
1.5	Shape Factor of different shapes	1
1.6	Moment – Curvature relationships	1
1.7	Plastic analysis of indeterminate beams	1
1.8	Plastic analysis of indeterminate frames	1
1.9	Upper and lower bound theorems and its applications	1
2	**MOVING LOADS AND INFLUENCE LINES**	
2.1	Concept of Moving loads and influence lines	1
2.2	Load categories: Single concentrated load	1
2.3	Load categories: Two concentrated loads	1
2.4	Load categories: UDL shorter than the span	1
2.5	Load categories: UDL longer than the span	1
2.6	Influence lines for statically determinate structures	2
2.7	Applications of Muller Breslau's principle	2
3	**MATRIX FLEXIBILITY METHOD**	
3.1	Concepts of Flexibility method, Equilibrium and Compatibility Equation.	1
3.2	Indeterminate structures, primary structures and compatibility conditions	1
3.3	Analysis of continuous beam (Concentrated Load and UDL)	2
3.4	Analysis of Pin Jointed frames (Concentrated Load and UDL)	2
3.5	Analysis of Overhanging beam (Concentrated Load and UDL)	2
3.6	Analysis of Pin Jointed frames (Unequal Support)	1
4	**MATRIX STIFFNESS METHOD**	1
4.1	Concepts of Stiffness method, Element and Global Stiffness matrices	1
4.2	Transformation and Rotational matrixes	1
4.3	Transformation of Stiffness matrix and its load , deflection vectors	1
4.4	Analysis of continuous beam (Concentrated Load and UDL)	2
4.5	Analysis of Pin Jointed frames (Concentrated Load and UDL)	2
4.6	Analysis of Overhanging beam (Concentrated Load and UDL)	1
4.7	Analysis of Pin Jointed frames (Unequal Support)	1

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5	**INTRODUCTION TO FINITE ELEMENT METHOD**	
5.1	Concepts of Finite Element method	1
5.2	Element, Nodes and Discretization of Structures	1
5.3	Elemental stiffness matrix for beam element- Axial load (Derivation)	2
5.4	Elemental stiffness matrix for beam element – UDL (Derivation)	1
5.5	Elemental stiffness matrix for Truss element (Derivation)	2
5.6	Elemental stiffness matrix for Triangular (CST) element (Derivation)	1
5.7	Plane Stress and Plane Strain elements	1
	Total	**45**

CourseDesigners

1. Dr. J .Abdul Bari - abdulbari@ksrct.ac.in

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60 CE 502	Foundation Engineering	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To provide an exposure to the site investigation and bore-log report.
- To impart knowledge in the selection of sites for investigate
- To determine the soil condition and provide the suitable foundation.
- To design the pile foundation based on capacity of super structure.
- To evaluate the problems for retaining structures.

Prerequisite

Courses – Geology, Soil Mechanics

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	State the knowledge on site investigation and soil exploration.	Remember/ Understand/ Analyse/Apply
CO2	Apply the concepts of bearing capacity of shallow foundations in homogeneous deposits	Remember/ Understand/ Analyse/Apply
CO3	Classify the footings and calculate the contact pressure distribution below footings	Remember/ Understand/ Analyse/Apply
CO4	Evaluate the concepts in load carrying capacity of piles, negative skin friction, pil groups and under reamed pile foundations	Remember/ Understand/ Analyse/Apply
CO5	Review the knowledge of plastic equilibrium in soils and Rankines theory on cohesion less and cohesive soil.	Remember/ Understand/ Analyse/Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	3	2	3	3	2	3	3
CO2	3	2	3	2	2	3	3	3	3	2	3	3
CO3	3	1	3	2	2	3	3	3	3	2	2	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	1	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember(Re)	05	05	15
Understand(Un)	05	05	15
Apply (Ap)	35	30	50
Analyse (An)	15	20	20
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60CE502 – Foundation Engineering								
B.E.Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

Site Investigation and Selection of Foundation*

Scope and objectives of soil exploration– Methods of exploration – Depth of exploration –spacing and Number of bore holes – Sampling – Sampling techniques –Disturbed and undisturbed samples –Types of samples - Split spoon sampler – Thin walled sample-Bore log Report – data interpretation – strength parameters – selection of foundation based on soil condition. **[09]**

Shallow Foundation*

Types of foundation – location and depth –bearing capacity: factors affecting bearing capacity – bearing capacity of shallow foundation on homogenous soil: Terzaghi and BIS formulae; Bearing capacity from In-situ tests: PLT-SPT-SCPT; Allowable bearing pressure; settlement: types - determination of settlement on granular and clay deposits – total and differential settlement - minimizing the total and differential settlement. **[09]**

Footings and Rafts**

Types of Footings – Contact pressure distribution; Types and proportioning: Isolated - Combined footings (for two columns only foundations; Floating foundation) – Raft and Mat. **[09]**

Pile Foundation**

Introduction to Piles -Classifications of piles; load carrying capacity of single pile in granular and cohesive soils: static and dynamic formulae; Pile group: efficiency of pile groups - settlement of pile group; Pile test: In-situ penetration tests – pile load tests; under reamed pile – pile capacity under uplift. Design of Pilecap **[09]**

Retaining Walls**

Introduction-Plastic equilibrium in soils – Active and passive states – Rankine's theory – Cohesion less and cohesive soil – Coloumb's wedge theory – Earth pressure on retaining walls of simple configurations – Pressure on the wall due to line load – Stability of retaining walls – active and passive earth pressure by graphical methods – Culman's methods – Rehbann's methods-Geomembrane. **[09]**

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book(s):

1. Gopala Ranjan,ASR Rao,"Basic and applied soil mechanics", New Age International Publishers, ND, 2015.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2017.

Reference(s):

1. Das, B.M."Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2012.
2. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi publications pvt.Ltd. New Delhi, 2015.
3. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, ND, 2011.
4. McCarthy D.F., "Essentials of Soil Mechanics & Foundations", Prentice-Hall, 2002

***SDG:4 – Quality Education**

****SDG:9 – Industry, Innovation and Infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Site Investigation and Selection of Foundation**	
1.1	Scope and objectives of soil exploration	1
1.2	Methods of exploration	1
1.3	Depth of exploration –spacing and Number	1

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1.4	Sampling – Sampling techniques	1
1.5	Disturbed and undisturbed samples	1
1.6	Types of samples	1
1.7	Split spoon sampler,Thin walled sample-Bore log Report	1
1.8	data interpretation and strength parameters	1
1.9	Selection of foundation based on soil condition.	1
2	**Shallow Foundation**	
2.1	Types of foundation	1
2.2	bearing capacity	1
2.3	factors affecting bearing capacity	1
2.4	bearing capacity of shallow foundation on homogenous soil	1
2.5	Tutorial	2
2.6	Terzaghi and BIS formulae	1
2.7	Bearing capacity from In-situ tests(PLT-SPT-SCPT)	1
2.8	Introduction to Allowable bearing pressure and settlement	1
2.9	types - determination of settlement on granular and clay deposits	1
2.10	Tutorial	2
2.11	Simple problems in total and differential settlement	1
3	**Footings and Rafts**	
3.1	Types of Footings	1
3.2	Contact pressure distribution	1
3.3	Use of Newmarks influence chart	1
3.4	Types and proportioning of Foundation	1
3.5	Combined footings (for two columns only foundations)	1
3.6	Tutorial	2
3.7	Raft Foundation	1
3.8	Mat Foundation	1
3.9	Isolated Foundation	1
3.10	Floating foundation	1
4	**Pile Foundation**	
4.1	Classifications of piles	1
4.2	Tutorial	2
4.3	load carrying capacity of single pile in granular and cohesive soils	1
4.4	static and dynamic formulae	1
4.5	Pile group	1
4.6	Tutorial	2
4.7	efficiency of pile groups	1
4.8	settlement of pile group	1
4.9	Pile test: In-situ penetration tests	1
4.10	pile load tests	1
4.11	under reamed pile – pile capacity under uplift	1

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5	**Retaining Walls**	
5.1	Introduction-Plastic equilibrium in soils and Geomembrane	1
5.2	Tutorial	2
5.3	Active and passive states	1
5.4	Rankine's theory	1
5.5	Coloumb's wedge theory	1
5.6	Tutorial	2
5.7	Earth pressure on retaining walls of simple configurations	1
5.8	Pressure on the wall due to line load	1
5.9	Problems in Stability of retaining walls	1
5.10	active and passive earth pressure by graphical methods	1
5.11	Culman's methods,Rehbann's methods	1
5.12	Tutorial	2

Course Designers

Dr.D.Sivakumar - sivakumard@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Machine Operations –Soil Sampling and Rock Sampling.
3. Solution of system of linear equations.
4. Computation of Index properties values
5. Finding ordinary and partial Foundation Systems.
6. Solving ordinary Terzaghi and BIS formulae equations.
7. Computing Maxima and Minima of a Earth Pressure Theory.
8. Computing Stability of retaining walls.

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60 CE 503	BASIC REINFORCED CONCRETE DESIGN	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To know the various methods available to design reinforced concrete structures
- To learn the design of slab for different boundary conditions
- To understand the design and detail of flexure members
- To gain the knowledge of limit state design for shear, torsion, bond andanchorage
- To carry out column and footing design using Limit state method

Prerequisite

Courses –Concrete Technology, Strength of Materials and Structural Analysis

Course Outcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Illustrate the various design philosophy to be used in the design of structural elements.	Remember/ Understand/ Analyse/Apply
CO2	Design one way and two way slab using Limit state method	Remember/ Understand/ Analyse/Apply
CO3	Apply IS codes in design of flexural members	Remember/ Understand/ Analyse/Apply
CO4	Design RC beams for shear, torsion, bond and anchorage	Remember/ Understand/ Analyse/Apply
CO5	Perform the design of RC column and isolated footing	Remember/ Understand/ Analyse/Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	3	2	3	3	2	3	3
CO2	3	3	3	2	2	3	3	3	3	2	3	3
CO3	3	3	3	2	2	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember(Re)	05	05	15
Understand(Un)	05	05	15
Apply (Ap)	35	30	50
Analyse (An)	15	20	20
Create (Cr)	-	-	-

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
60 CE 503 - Basic Reinforced Concrete Design								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

Design Philosophy* Introduction - Grades of concrete and steel - Stress strain curve for steel and concrete- Concept of elastic method, ultimate load method and limit statemethod - Advantages of Limit State method over other methods - Limit State philosophy as detailed in IS456-2000 - Load and Load combinations - characteristic strength and design strength of materials, characteristic loads and design loads - Partial safety factor	**[08]**
Limit State Design of Slab* Behavior of one way and two-way slab - Design of one waysimply supported and continuous slab - Design ofTwo-way rectangular slab for various boundary conditions - curtailment of reinforcement. - Design of cantilever slab.	**[09]**
Limit State Design for Flexure* Analysis and design of Singly reinforced beams, doubly reinforced beams and Flanged beams (T and L beams).	**[10]**
Limit State Design for Shear &Torsion* Behavior of RC members in shear& torsion - Design requirements – Design of RCbeams in shear - Design of RC members for combined bending, shear and torsion –Design for bond and anchorages – Detailing of reinforcement	**[08]**
Limit State Design of Columns andIsolated Footings* Types of columns - Provisions of IS-456 code for the design of columns- Design of short RC column for axial,uniaxial and biaxial bending. -Design of long column subjected toaxial load– Use of design aids- Types of footing - Design of Isolated footing	**[10]**
TotalHours	**45**

Textbook(s):

1.	B. C. Punmia, A. K. Jain, Limit State Design of Reinforced Concrete, LaxmiPublications, New Delhi 2016
2.	Krishna Raju, N., “Design of Reinforced Concrete Structures”, CBS Publishers & Distributors Pvt. Ltd.,New Delhi, 2016

Reference(s):

2.	S. N. Sinha, Reinforced Concrete Design, McGraw Hill Education (India) Private Limited; New Delhi, 2017.
3.	IS 456 - 2000 “Code of practice for Plain and Reinforced concrete”, BIS New Delhi.
4.	S.S.Bhavikatti, Design of R.C.C. Structural Elements Vol. I, New Age International Publishers,New Delhi, 2020
5.	Dr. H. J. Shah, Reinforced Concrete Vol. I [Elementary Reinforced Concrete] ,Charotar Publishing House Pvt. Ltd.,Gujarat, 2016

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Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Design Philosophy**	
1.1	Introduction to the course	1
1.2	Grades of concrete and steel - Stress strain curve for steel and concrete	1
1.3	Concept of elastic method, ultimate load method and limit state method	1
1.4	Comparison of all methods &Advantages of Limit State method over other methods	1
1.5	Limit State philosophy as detailed in IS456-2000	2
1.6	Load and Load combinations	1
1.7	Characteristic strength and design strength of materials, characteristic loads and design loads - Partial safety factor	1
2	**Limit State Design of Slab**	
2.1	Behavior of one way and two-way slab	1
2.2	Design of one waysimply supported and continuous slab (Design Procedure & Problems)	2
2.3	Tutorial	2
2.4	Design ofTwo-way rectangular slab for various boundary conditions	3
2.5	Reinforcement detailing for two-way slabs(Different boundary conditions - Design Procedure & Problems)	1
2.6	Design of cantilever slab (Design Procedure & Problems)	2
2.7	Tutorial	2
3	**Limit State Design for Flexure**	
3.1	Flexure concepts and types of beams	1
3.2	Analysis and design of singly reinforced beams (Procedure & Problems)	3
3.3	Tutorial	2
3.4	Analysis and design of doubly reinforced beams (Procedure & Problems)	3
3.5	Analysis and design of flanged beams (T and L beams - Procedure & Problems)	3
3.6	Tutorial	2
4	**Limit State Design for Shear &Torsion**	
4.1	Behavior of RC members in shear & torsion - Design requirements	1
4.2	Design of RCbeams in shear - Problems	3
4.3	Tutorial	2
4.4	Design of RC members for combined bending, shear and torsion - Problems	3
4.5	Design for bond and anchorages - Detailing of reinforcement	1
4.6	Tutorial	1
5	**Limit State Design of Columns and Isolated Footings**	
5.1	Types of columns, Provisions of IS-456 code for the design of columns	1
5.2	Design of short RC column for axial,uniaxial and biaxial bending - Problems	3
5.3	Tutorial	2
5.4	Design of long column subjected toaxial load – Use of design aids	3
5.5	Types of footing - Design of Isolated footing – Problems	3
5.6	Tutorial	2

Course Designer

1. Mr.K.ANGU SENTHIL - angusenthil@ksrct.ac.in

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60CE504	Highway and Railway Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objective

- To gain knowledge about planning, design, construction of highway
- To study the essentials materials used in Highway and Railways
- To understand the basic concepts of practices and maintenance of pavements.
- To acquire knowledge of location and planning and design of track of railway.
- To acquire knowledge of site investigation for location and planning of highways and railways.

Prerequisite

Basic knowledge of surveying.

Course Outcomes

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

CO1	Describe the engineering survey and highway geometric design	Knowledge/ Analyse/ Apply
CO2	Select the suitable highway materials and pavements	Knowledge/ Analyse/ Apply
CO3	Explain the importance of highway construction and maintenance works	Knowledge/ Analyse/ Apply
CO4	Infer the importance of railways and the functions of ballast and sleepers	Knowledge/ Analyse/ Apply
CO5	Express the principles of signaling and the layouts of railway station and yards	Knowledge/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2	3	1	2	1	1		3
CO2	3	3	2	1	2	3	2	2	3	1		3
CO3	3	2	1	3	1	1	1	2	2	1		3
CO4	3	2	3	2	3	1	1	3	2	1		3
CO5	3	2	3	2	3	1	1	3	1	1		3
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	30	30	50
Apply (Ap)	20	20	30
Analyse (An)	10	10	20
Create (Cr)		-	-

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K.S.Rangasamy College of Technology – Autonomous R 2022								
60 CE 504 - Highway and Railway Engineering								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Highway Planning and Geometric Design* ** History of road development in India - Classification of highways – Engineering surveys for alignment - Highway geometrics and their standards: width of element, camber – Horizontal curves - Super elevation , transition curves – Widening of pavements - Sight distances - Vertical curves – Gradients.	**[09]**
Highway Materials and Design of Pavements* ** Highway materials, their requirements and testing-Design principles- Pavement components and their role - Factors affecting the design of pavements - Design practice for flexible pavement - CBR and IRC method - Rigid pavements - IRC recommendations.	**[09]**
Highway Construction Practice and Maintenance* ** Construction practice: Water bound macadam road, Bituminous road and Concrete road – Modern materials and methods of construction - Highway drainage – Special considerations for hill roads – Highway project formulation - Pavement distress in flexible and rigid pavements - Pavement evaluation by deflection measurements – Strengthening of pavements – Highway maintenance – Over lay design by Benkelman Beam method (procedure only) – Plastic Roads.	**[09]**
Railways Planning* ** Role of Indian Railways in National Development – Private railway coaches in India - Permanent way: components and Functions; Rails: Types, rail fastenings, Rail joints; Gauges, coning of wheels, creeps and kinks; Sleepers: Function, Materials, Density; Ballasts: Function, materials.	**[09]**
Railway Track Operation* ** Working Principle of Signaling, interlocking and Track Circuiting - Layouts of railway station and yards – Rolling stock, Tractive power, Track Resistance, Level Crossing, Underground Railways.	**[09]**
TotalHours	**45**

Textbook(s):

1.	Khanna, S.K and Justo, C.E.G., “Highway Engineering”, Nem Chand and Brothers, 2019
2.	Arora, S.P and Saxena, S.C., “A text book of Railway Engineering“, Dhanpat Rai and Sons, 2014.

Reference(s):

1.	Beverly T. Kuhn., “Transportation Engineering: A Practical Approach to Highway Design, Traffic Analysis, and Systems Operations”, Tata Mc Graw Hill, 2019.
2.	Subramanian, K.P., “Transportation Engineering”, Scitech Publishers, 2018.
3.	Kadiyali, L.R, and Lal,N.B., “Principles and Practice of Highway Engineering”, Khanna Technical Publications, 2014.
4.	Mundrey, J.S., “Railway Track Engineering”, Tata Mcgraw Hill Publishing Co Ltd, 2013

***SDG - 4: Quality Education ** SDG - 11: Sustainable Cities and Communities**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Highway Planning and Geometric Design**	
1.1	History of road development in India	1
1.2	Classification of highways	1
1.3	Engineering surveys for alignment	1
1.4	Highway geometrics and their standards	1
1.5	Super elevation and Transition curves	2
1.6	Sight distances and gradients	2
1.7	Horizontal curves and Vertical curves	1
2	**Highway Materials and Design of Pavements**	
2.1	Highway materials, their requirements and testing	1

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2.2	Design principles and IRC recommendations	1
2.3	Pavement components and their role	1
2.4	Factors affecting the design of pavements	1
2.5	Design practice for flexible pavement CBR method	2
2.6	Design practice for flexible pavement IRC method	2
2.7	Rigid pavements	1
3	**Highway Construction Practice and Maintenance**	
3.1	Water bound macadam road, Bituminous road and Concrete road	2
3.2	Modern materials and methods of construction	1
3.3	Highway drainage and Its types	1
3.4	Pavement distress in flexible pavements	1
3.5	Pavement distress in rigid pavements	1
3.6	Pavement evaluation by deflection measurements	1
3.7	Strengthening of pavements and Highway maintenance	1
3.8	Over lay design by Benkelman Beam method (procedure only)	1
4	**Railways Planning**	
4.1	Role of Indian Railways in National Development	1
4.2	Private railway coaches in India	1
4.3	Rails: Types, rail fastenings	1
4.4	Rail joints; Gauges, coning of wheels	1
4.5	Creeps and kinks	1
4.6	Sleepers: Function, Materials, Density	2
4.7	Ballast: Function, Materials, Density	2
5	**Railway Track Operation**	
5.1	Working Principle of Signaling	1
5.2	Layouts of railway station	2
5.3	Layouts of railway station yards	2
5.4	Rolling stock	1
5.5	Tractive power	1
5.6	Track Resistance and Level Crossing	1
5.7	Underground Railways.	1
	Total	**45**

Course Designer

1. Dr.K.Yuvaraj - yuvarajk@ksrct.ac.in

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		Category	L	T	P	Credit
60MY003	STARTUPS AND ENTREPRENEURSHIP	MY	2	0	0	-

Objective

- To provides practical proven tools for transforming an idea into a product or service that creates value for others.
- To build a winning strategy, how to shape a unique value proposition, prepare a business plan
- To impart practical knowledge on business opportunities
- To inculcate the habit of becoming entrepreneur
- To know the financing, growth and new venture & its problems

Prerequisite

Basic knowledge of reading and writing in English.

Course Outcomes

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

CO1	Listen and comprehend Meaning and concept of Entrepreneurship	Understand
CO2	Identify the businessopportunities andable preparebusinessplan	Analyze
CO3	Comprehend the process of innovation, incubation, prototyping and marketing	Understand
CO4	Executing a new venture through various financial resources	Apply
CO5	Grasp the managing growth and rewards in new venture	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	3	1	2	1		2	2
CO2	2	3	3	2	2		2	2	2		2	2
CO3	3	2	3	1	2				1	3	1	3
CO4	3	3	3	3	3	2	2	1		1	3	3
CO5	3	2	3	3	3			2			3	2

3- Strong; 2-Medium; 1-Some

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests(Marks)		Case Study Report
	1 (25 Marks)	2 (25 Marks)	
Remember (Re)	10	10	50 Marks
Apply (Ap)	20	20	
Analyse (An)	30	30	
Create (Cr)	0	0	

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K.S.Rangasamy College of Technology–Autonomous								R2022
60 MY 003 – Startups and Entrepreneurship								
Commontoall Branches								
Semester	Hours/Week			Total Hrs.	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	0	30	-	100	--	100

Introduction to Entrepreneurship & Entrepreneur* Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship,role ofEntrepreneurship inEconomicDevelopment,Agenciesin EntrepreneurshipManagementandFutureofEntrepreneurship. The Entrepreneur: Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system.	[6]
Business Opportunity Identification and Preparing a Business Plan* Businessideas,methodsofgeneratingideas,andopportunityrecognition,IdeaGenerationProcess,Feasibilitystudy,preparingaBusinessPlan:Meaningandsignificanceofabusinessplan,components ofabusiness plan.	[6]
Innovations** InnovationandCreativity-Introduction,InnovationinCurrent.Environment,TypesofInnovation,SchoolofInnovation,AnalysingtheCurrent BusinessScenario,ChallengesofInnovation,StepsofInnovationManagement,ExperimentationinInnovationManagement,ParticipationforInnovation,Co-creationforInnovation,PrototypingtoIncubation.BlueOceanStrategy-I,BlueOceanStrategy-II.MarketingofInnovation,TechnologyInnovationProcess	[6]
Financing and Launching the New Venture* Importanceofnewventurefinancing,typesofownership,venturecapital,typesofdebtsecurities,determiningideal debt-equity mix, andfinancialinstitutions and banks. LaunchingtheNewVenture:Choosingthelegalformofnewventure,protectionofintellectualproperty,and formationof the newventure.	[6]
Managing Growth and Rewards in New Venture* Characteristicsofhighgrowthnewventures,strategiesforgrowth,andbuildingthenew ventures.Managing Rewards:ExitstrategiesforEntrepreneurs, Mergersand Acquisition,Successionandexitstrategy,managingfailures–bankruptcy.	[6]
TotalHours	**30**

TextBook(s):

1.	StephenKey,"OneSimpleIdeaforStartupsandEntrepreneurs:LiveYourDreamsandCreateYourOwn Profitable Company" 1st Edition,TataMcGrawhillCompany,NewDelhi,2013.
2	CharlesBamfordandGarryBruton,"Entrepreneurship:TheArt,Science,andProcessfor Success",2nd Edition,TataMcGrawhillCompany,NewDelhi,2016.

Reference(s):

1.	PhilipAuerswald,"TheComingProsperity:HowEntrepreneursAreTransformingtheGlobal Economy",OxfordUniversityPress,2012.
2.	JanetKiholmSmith;RichardL.Smith;RichardT.Bliss,"EntrepreneurialFinance:Strategy,Valuation andDealStructure,StanfordEconomicsandFinance",2011
3.	EdwardD.Hess,"GrowinganEntrepreneurialBusiness:ConceptsandCases",StanfordBusiness Books,2011
4.	HowardLove,"TheStart-UpJCurve:TheSixStepstoEntrepreneurialSuccess",BookGroupPress, 2011.

***SDG:8 – Decent Work and Economic Growth**
***SDG:12 – Responsible Consumption and Production**
****SDG:9 – Industry, Innovation and Infrastructure**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Periods
1	**Introduction to Entrepreneurship & Entrepreneur**	
1.1	Meaning and concept of Entrepreneurship, the history of Entrepreneurship development,	1
1.2	Myths of Entrepreneurship,role ofEntrepreneurship inEconomicDevelopment,	1
1.3	Agenciesin EntrepreneurshipManagementandFutureofEntrepreneurship.	1
1.4	The Entrepreneur: Meaning, the skills required to be an entrepreneur,	1
1.5	The entrepreneurial decision process	1
1.6	Rolemodels	1
1.7	MentorsandSupportsystem.	1
2	**Business Opportunity Identification and Preparing a Business Plan**	
2.1	Businessideas,methodsofgeneratingideas	1
2.2	Opportunityrecognition	1
2.3	IdeaGenerationProcess	1
2.4	Feasibilitystudy	1
2.5	PreparingaBusinessPlan	1
2.6	Meaningandsignificanceofabusinessplan	1
2.7	Components ofabusiness plan	1
3	**Innovations**	
3.1	InnovationandCreativity-Introduction,InnovationinCurrent.Environment	1
3.2	TypesofInnovation,SchoolofInnovation,AnalyzingtheCurrentBusinessScenario	1
3.3	ChallengesofInnovation,StepsofInnovationManagement	1
3.4	ExperimentationinInnovationManagement,ParticipationforInnovation,	1
3.5	Co-creationforInnovation,PrototypingtoIncubation.	1
3.6	Blue OceanStrategy-I,BlueOceanStrategy-II.	1
3.7	MarketingofInnovation,TechnologyInnovationProcess	1
4	**Financing and Launching the New Venture**	
4.1	Importanceofnewventurefinancing,typesofownership,	1
4.2	Venturecapital,typesofdebtsecurities	1
4.3	Determiningidealdebt-equity mix, andfinancialinstitutions and banks.	1
4.4	LaunchingtheNewVenture	1
4.5	Choosingthelegalformofnewventure,	1
4.6	Protectionofintellectualproperty	1
4.7	Formationof thenewventure	1
5	**Managing Growth and Rewards in New Venture**	
5.1	Characteristicsofhighgrowthnewventures	1
5.2	Strategiesforgrowth	1
5.3	Buildingthenew ventures	1
5.4	Managing Rewards	1
5.5	ExitstrategiesforEntrepreneurs,	1
5.6	Mergersand Acquisition, Successionandexitstrategy	1
5.7	Managingfailures–bankruptcy.	1
	Total Hours	**30**

CourseDesigners

1. Dr.N.Tiruvenkadam - tiruvenkadam@ksrct.ac.in

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60CE 5P1	Geotechnical Engineering Laboratory	Category	L	T	P	Credit
		PC	0	0	2	2

Objective

- To acquire knowledge on index properties of soils.
- To determine engineering properties of the soils.
- To Provide field in-situ test for cohesive soil
- To know the settlement of foundation by consolidation test
- To understand the California Bearing ratio test.

Prerequisite

Courses – Geology, Soil Mechanics , Foundation Engineering

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	List the basic concepts and the properties of soil.	Remember/ Understand/ Analyse/Apply
CO2	Classify the soils by sieve analysis, hydrometer method and specific gravity.	Remember/ Understand/ Analyse/Apply
CO3	Apply the knowledge of science and techniques in engineering properties of soil.	Remember/ Understand/ Analyse/Apply
CO4	Identify to design and conduct experiments to analyze critically and interpret resulting data related to various engineering properties of soil.	Remember/ Understand/ Analyse/Apply
CO5	Evaluate the impact of field density of soil and California Bearing Ratio Test	Remember/ Understand/ Analyse/Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	3	2	3	3	2	3	3
CO2	3	2	3	2	2	3	3	3	3	2	3	3
CO3	3	1	3	2	2	3	3	3	3	2	2	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	1	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

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LIST OF EXPERIMENTS

1. DETERMINATION OF INDEX PROPERTIES *
a. Specific gravity of soil solids
b. Grain size distribution – Sieve analysis
c. Grain size distribution -Hydrometer analysis
d. Liquid limit and Plastic limit tests
e. Shrinkage limit and Differential free swell tests

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS**
a. Field density Test (Sand replacement method)
b. Determination of moisture – density relationship using standard Proctor compaction test.

3.DETERMINATION OF ENGINEERING PROPERTIES**
a. Permeability determination (constant head and falling head methods)
b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
c. Direct shear test in cohesion-less soil
d. Unconfined compression test in cohesive soil
e. Laboratory vane Shear test in cohesive soil
f. Tri-axial compression test in cohesion-less soil (Demonstration only)
g. California Bearing ratio

Total Hours: 60

Course Material:

1	Lab manual Prepared by KSRCT – Civil Department.

***SDG:4 – Quality Education**
****SDG:9 – Industry, Innovation and Infrastructure**

Course Designers

Dr.D.Sivakumar - sivakumard@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB for Geotechnical lab
2. Matrix Operations –for soil properties .
3. Solution of system of linear equations.
4. Computation of Eigen values and Eigen vectors of a Matrix.
5. Finding ordinary and partial derivatives.
6. Solving first and second order ordinary differential equations.
7. Computing Maxima and Minima of a function of one variable.
8. Computing Maxima and Minima of a function of two variables.

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60 CE 5P2	ENVIRONMENTAL ENGINEERING LABORATORY	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To understand the general quality of water and wastewater.
- To evaluate the physico-chemical parameters of water and wastewater.
- To estimate the presence of organic matter and nutrients in water and wastewater.
- To detect the contamination in water for various uses.
- To decide the type of treatment required and evaluate the efficiency of treatment units.

Prerequisite

60 CE 403 - Water Supply and Wastewater Engineering.

Course Outcomes

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

CO1	Estimate the basic parameters of water and wastewater.	Remember, Understand, Apply
CO2	Determine the chemical parameters present in water and wastewater.	Remember, Understand, Apply
CO3	Compute the optimum coagulant dosages for water treatment.	Remember, Understand, Apply
CO4	Analyze the available chlorine in bleaching powder for chlorination.	Remember, Understand, Apply
CO5	Determine the parameters used in wastewater treatment plants.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	3	3	2		2		2
CO2	3	3	2	3	1	3	3	2		2		2
CO3	3	3	2	3	1	3	3	2		2		2
CO4	3	3	2	3	1	3	3	2		2		2
CO5	3	3	2	3	1	3	3	2		2		2
3 - Strong; 2 - Medium; 1 - Some												

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K.S.Rangasamy College of Technology – Autonomous R2022
60 CE 5P2 - Environmental Engineering Laboratory
Civil Engineering

List of Experiments:

1. Sampling and preservation methods of water and wastewater *
2. Determination of Turbidity, Conductivity and pH *
3. Determination of Hardness *
4. Determination of Chlorides *
5. Determination of Sulphates *
6. Determination of Fluorides *
7. Determination of Iron *
8. Estimation of Optimum Coagulant Dosage *
9. Estimation of Available Chlorine in Bleaching Powder *
10. Determination of Dissolved Solids and Suspended Solids *
11. Determination of Dissolved Oxygen *
12. Determination of Biochemical Oxygen Demand *
13. Determination of Chemical Oxygen Demand *

* SDG 6 – Clean Water and Sanitation

CourseDesigners

1. Dr. P. Mageshkumar - mageshkumarp@gmail.com

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60 CG 0P4	CAREER SKILL DEVELOPMENT IV	Category	L	T	P	Credit
		CS	0	0	2	1

Objective

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Prerequisite

Basic knowledge of Arithmetic and Logical Reasoning

Course Outcomes

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

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2	2	3		3				2	3	3	3	
CO2	3	3	3	3		2				2	3	3	3	2
CO3	2	2	2	2		3				2	3	3	3	1
CO4	3	3	3	3		2				2	3	3	2	2
CO5	3	3	3	3		2				2	3	3	3	3
3- Strong;2-Medium;1-Some														

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K.S.RangasamyCollege ofTechnology–AutonomousR2022								
Career Skill Development IV								
Common to All Branches								
Semester	Hours/Week			TotalHrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
V	0	0	2	30	1	100	00	100

Verbal & Analytical Reasoning Seating Arrangements – Analytical Reasoning (PUZZELS) – Machin input and output - Coded Inequality – Eligibility Test	**[6]**
Quantitative Aptitude - Part – 4 Permutation and Combination - Probability - Quadratic equation - Geometry – Clock – Calendar – Logarithmic	**[6]**
Non-Verbal Reasoning Series Completion of Figures – Classification – Courting of figure – Figure matrix – Embedded Figure – Complete Figure – Paper Cutting and Folding – Mirror images and Water Images	**[6]**
Quantitative Aptitude - Part – 5 Mensuration of Area, Volume and Surface area in 2D and 3D Shapes – 2D Shapes – Square, Rectangle, Triangle, Circle, etc. - 3D Shapes – Cube, Cuboid , Sphere , Cone , etc.	**[6]**
Data Interpretation and Analysis Data interpretation Based on text - Data interpretation Based on Tabulation , Pie chart , Bar graph , And Line graph – Venn Diagram - Data sufficiency	**[6]**
TotalHours	**30**

Reference(s):

1. Aggarwal, R.S. *'A Modern Approach to Verbal and Non-verbal Reasoning'*, Revised Edition 2008,Reprint 2009,S.Chand & Co Ltd., New Delhi.
2. Abhijit Guha, *'Quantitative Aptitude'*, McGraw Hill Education, 6th edition, 2016
3. Dinesh Khattar,'Quantitative Aptitude For Competitive Examinations', Pearson Education (2020)
4. Anne Thomson, *'Critical Reasoning: A Practical Introduction'*Lexicon Books, 3rd edition,2022. Warszaw

SDG 4 – Quality Education
SDG 8 – Decent work and Economic growth
SDG 9 – Industry, innovation and Infrastructure

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Verbal & Analytical Reasoning**	
1.1	Seating Arrangements	1
1.2	Analytical Reasoning (PUZZELS)	1
1.3	Machin input and output	1
1.4	Coded Inequality	1
1.5	Eligibility Test	2
2	**Quantitative Aptitude - Part – 4**	
2.1	Permutation and Combination	1

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2.2	Probability	1
2.3	Quadratic equation - Geometry	1
2.4	Clock – Calendar	1
2.5	Logarithmic	2
3	**Non-Verbal Reasoning**	
3.1	Series Completion of Figures – Classification	1
3.2	Courting of figure – Figure matrix	1
3.3	Embedded Figure – Complete Figure	1
3.4	Paper Cutting and Folding	1
3.5	Mirror images and Water Images	2
4	**Quantitative Aptitude - Part – 5**	
4.1	Mensuration of Area, Volume	1
4.2	Mensuration of Volume	1
4.3	Surface area in 2D and 3D Shapes	1
4.4	2D Shapes – Square, Rectangle, Triangle, Circle, etc.	1
4.5	3D Shapes – Cube, Cuboid , Sphere , Cone , etc.	2
5	**Data Interpretation and Analysis**	
5.1	Data interpretation Based on text	1
5.2	Data interpretation Based on Tabulation, Pie chart	1
5.3	Bar graph , And Line graph	1
5.4	Venn Diagram	1
5.5	Data sufficiency	2
	Total	**30**

CourseDesigner

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

SIXTH SEMESTER

S. No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CE 601	Advanced Reinforced Concrete Design	2	40	60	100	45	100
2	60 CE 602	Design of Steel Structures	2	40	60	100	45	100
3	60 CE 603	Construction Planning and Management	2	40	60	100	45	100
4	60 CE 604	Hydrology and Water Resources Engineering	2	40	60	100	45	100
5	60 CE E*	Professional Elective II	2	40	60	100	45	100
6	60 CE L**	Open Elective – II	2	40	60	100	45	100
7	60 AB 00*	NCC\NSS\NSO\YRC\RRC\ Yoga\Fine Arts	-	100	-	100	-	-
PRACTICAL								
8	60 CE 6P1	Concrete and Highway Laboratory	3	60	40	100	45	100
9	60 CE 6P2	Computer Aided Analysis and Design Laboratory	3	60	40	100	45	100
10	60 CE 6P3	Miniproject	-	100	-	100	-	100
11	60 CG 0P5	Comprehensive Test	-	100	-	100	-	100
12	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests.This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

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Faculty of Civil Engineering
K.S.Rangasamy College of Technology
TIRUCHENGODE - 637 215

60 CE 601	Advanced Reinforced Concrete Design	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To understand the design concept of various structures and detailing ofReinforcements
- To Understand the basic concepts and behavior of continuous flexural members
- To bring about an exposure to advanced topics in structural design comprising of RCCretaining walls, water tanks and Flat slabs.
- To study the design of staircases
- To gain design knowledge related to structures, systems that are likely to be encountered in professional practice

Prerequisite

Fundamentals of Mathematics, knowledge of analysis of structures and Fundamendals of reinforced concrete Design

Course Outcomes

Onthesuccessful completion ofthecourse, studentswill beable to

CO1	To gain design knowledge related to structures, systems that are likely to beencountered in professional practice	Create
CO2	Design interior and exterior panels of flat slab.	Apply
CO3	Identify the suitable retaining wall and design cantilever, counter fort retaining wall	Understand
CO4	Design various types of liquid storage structures as per Indian standard codal provision.	Apply
CO5	Design and detail the stair case, RCC wall and Deep beam.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		3					3			3	
CO2	1	2	3					3			3	
CO3	1	2	3					3			3	
CO4	1		3					3			3	
CO5	1	2	3					3			3	

3- Strong;2-Medium;1-Some

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	10	10	20
Analyse	10	10	20
Evaluate	10	10	10
Create	10	10	30

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K.S.Rangasamy College of Technology–Autonomous								R2022
60 CE 601 - Advanced Reinforced Concrete Design								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	40	60	100

Design of Continuous Flexural Members* Concept of moment redistribution- Live load arrangements - Design of Continuous beams and slab.	**[09]**
Design of Flat Slabs* Flat slab- Types and components – Design of interior and exterior panels	**[09]**
Retaining Wall* Retaining wall- Types – Components- Forces and Stability requirements- Design of cantilever and counter fortretaining walls.	**[09]**
Water Tank* Water tank- Classification- Design of circular and rectangular water tank- resting on ground and underground.	**[09]**
Miscellaneous* Types of staircases- Design of doglegged staircases – Design of reinforced concrete walls- Design of combined footing – Approximate method of structural analysis.	**[09]**
TotalHours	**60**

Textbook(s):

1.	Gambhir.M. L, “Design of Reinforced Concrete Structures”, Prentice Hall of India, Ed Fourth, 2012.
2.	N Krishna Raju and R.N. Pranesh, “Design of Reinforced Concrete Structures”, New Age International EdFirst,2018.

Reference(s):

1.	Ramamrutham S, Design of Reinforced Concrete Structures, Dhanpat Rai Ed Seventeenth , 2016
2.	Dayaratnam, P, “Design of Reinforced Concrete Structures”, Oxford & IBH Publishers Ed first, 2005.
3.	C.Syal and A.K.Goel, “Reinforced Concrete Structures”, S.Chand and Company Ed Fourth, 2012.
4.	Edward G. Nawy, “Reinforced Concrete – A fundamental Approach”, Prentice Hall Ed Sixth, 2008.

***SDG:4 Quality Education, SDG:9: Industry, innovation and infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Design of Continuous Flexural Members**	
1.1	Definition and types of flexural members	1
1.2	Analysis and design considerations for moment redistribution	1
1.3	Case studies and practical examples of live load arrangements in different structures	1
1.4	Analysis and design of continuous beams under different loading conditions	2
1.5	Analysis and design considerations for continuous slabs	2
1.6	Real-world case studies highlighting the application of concepts learned	2
2	**Design of Flat Slabs**	
2.1	Overview of flat slabs and their applications in modern construction	1

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2.2	Classification of flat slabs based on different parameters	1
2.3	Two-way flat slabs, one-way flat slabs, and their specificcharacteristics	2
2.4	Behavior and load-carrying capacity of different types of flat slabs	1
2.5	Detailing of flat slab components for efficient load distribution	1
2.6	Structural analysis of interior panels in flat slab systems	1
2.7	Design considerations for interior panels under various loading conditions	1
2.8	Reinforcement detailing for controlling cracking and improving structural performance	1
2.9	Group design projects to apply learned principles in practical scenarios	1
2.10	Sustainable design practices and their application in flat slab construction	1
3	**Retaining Wall**	
3.1	Comparison of different types of retaining walls and their applications	2
3.2	Gravity retaining walls, cantilever retaining walls, counterfort retaining walls, and their specific characteristics	2
3.3	Detailed study of the key components of retaining walls	1
3.4	Analysis of the design process for cantilever retaining walls	1
3.5	Analysis of the role of counterforts in improving the stability and load-bearing capacity of retaining walls	1
3.6	Calculation of forces and moments in counterfort retaining walls for optimal design and performance	1
3.7	Introduction to innovative materials and technologies in the construction of retaining walls	1
4	**Water Tank**	
4.1	Comparison of different types of water tanks and their specific characteristics	2
4.2	Evaluation of factors influencing the design of water tanks, such as water pressure, seismic loads, and environmental factors	1
4.3	Determination of required reinforcement and detailing for circular water tanks resting on the ground	1
4.4	Design of Circular Water Tanks Underground	1
4.5	Detailing of reinforcement and considerations for construction joints in rectangular water tanks resting on the ground	1
4.6	Seismic design considerations for water tanks	1
4.8	Introduction to innovative technologies in water tank design and construction	1
4.9	Exploration of future trends and advancements in the field of water tank design	1
5	**Miscellaneous**	
5.1	Analysis of different types of staircases, including ordinary and dog-legged	2
5.2	Detailing and reinforcement requirements for ensuring stability and strength of concrete wall	1
5.3	Evaluation of shear, flexural, and axial forces in reinforced concrete walls	1
5.4	Implementation of design considerations for ensuring the stability and performance of combined footings	1
5.5	Understanding the interaction between different structural elements in a building system	1

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5.6	Analysis of load transfer mechanisms between staircases, walls, and footings	1
5.7	Presentation and discussion of design projects for constructive feedback	1

CourseDesigners

1. Dr.K.VIJAYA SUNDRAVEL - vijayasundravel@ksrct.ac.in

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60 CE 602	DESIGN OF STEEL STRUCTURES	Category	L	T	P	Credit
		PC	3	1	0	4

Objective

- To understand the basic concepts of limit state design of structural members
- To Design bolted and welded connections
- To Learn the design of compression members & tension members
- To understand the concept of lateral buckling and design various elements like, plate girder and beam- column.
- To understand the Design of purlin, elements of trussandgantry girder.

Prerequisite

Courses –Strength of Materials and Structural Analysis

Course Outcomes

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

CO1	Identify the concepts of bearing & friction type bolted connections and welded connections	Remember/ Understand/ Analyse/Apply
CO2	Illustrate the design of tension members	Remember/ Understand/ Analyse/Apply
CO3	Design the compression members and plate girders.	Remember/ Understand/ Analyse/Apply
CO4	Outline the design concepts of laterally supported and laterally unsupporte beams	Remember/ Understand/ Analyse/Apply
CO5	Analyze the different types of truss for the calculated loads	Remember/ Understand/ Analyse/Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	3	2	3	3	2	3	3
CO2	3	3	3	2	2	3	3	3	3	2	3	3
CO3	3	3	3	2	2	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3	3	2	2	3	3
CO5	3	3	3	3	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember(Re)	05	05	15
Understand(Un)	05	05	15
Apply (Ap)	35	30	50
Analyse (An)	15	20	20
Create (Cr)	-	-	-

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K.S. Rangasamy College of Technology–Autonomous								R2022
60 CE 602 - DESIGN OF STEEL STRUCTURES								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	40	60	100

INTRODUCTION** Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures –Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections – Efficiency of joints.	**[09]**
TENSIONMEMBERS** Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag	**[09]**
COMPRESSIONMEMBERS** Types of compression members – Basis of current codal provision for compression member design – Slenderness ratio–Designofsinglesectionandcompoundsectioncompressionmembers–Designoflacedandbattened type columns – Gusseted base.	**[09]**
BEAMS** Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders – Intermediate and bearing stiffeners – Flange and web splices.	**[09]**
ROOF TRUSSES AND INDUSTRIAL STRUCTURES** Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.	**[09]**
Total Hours = 45 Theory +15 Tutorial = 60Hrs	

Textbook(s):

1.	Subramaniam.N.“DesignofSteelStructures“,(AsperIS800-2007),OxfordUniversityPress,2012.
2.	BhavikattiSS,“DesignofSteelStructures”,I.K.InternationalPublishingHousePvt.Ltd2012

Reference(s):

2.	DuggalSK.,’’LimitStateDesignofSteelStructures”,TataMcGrawHill,NewDelhi,2012.
3.	TeachingResourcesforStructuralSteelDesign,INSDAG,Kolkata,2010.
4.	IS800–2007,“CodeofPracticeforGeneralConstructioninsteel”,BIS,NewDelhi.
5.	SairamK.S“DesignofSteelStructures”,PearsonPublication,2013

****SDG9**: Industry, innovation and infrastructure

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**INTRODUCTION**	
1.1	Properties of steel and Structural steel sections	1
1.2	Limit State Design Concepts and Loads on Structures	1
1.3	Connections using rivets, welding, bolting	1
1.4	Design of bolted and welded joints-Concepts	1
1.5	Design of bolted and welded joints- Solve the problems	1
1.6	Eccentric connections - Concepts	1
1.7	Eccentric connections- Solve the problems	1
1.8	Efficiency of joints Concepts	1
1.9	Efficiency of joints- Solve the problems	1

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2	**TENSION MEMBERS**	
2.1	Types of sections – Net area	1
2.2	Net effective sections for angles and Tee in tension	1
2.3	Design of connections in tension members- Concepts	1
2.4	Design of connections in tension members- Solve the problems	1
2.5	Use of lug angles	1
2.6	Design of tension splice- Concepts	1
2.7	Design of tension splice- Solve the problems	1
2.8	Concept of shear lag- Concepts	1
2.9	Concept of shear lag- Solve the problems	1
3	**COMPRESSION MEMBERS**	
3.1	Types of compression members	1
3.2	Basis of current codal provision for compression member design	1
3.3	Slenderness ratio – Design of single section and compound section compression members- Concepts	1
3.4	Design of single and compound section- Concepts	1
3.5	Design of single and compound section- Solve the problems	1
3.6	Design of laced and battened type columns- Concepts	1
3.7	Design of laced and battened type columns- Solve the problems	1
3.8	Design of column bases- Concepts	1
3.9	Design of column bases- Solve the problems	1
4	**BEAMS**	
4.1	Design of laterally supported and unsupported beams- Concepts	1
4.2	Design of laterally supported and unsupported beams-Solve the problems	1
4.3	Built up beams- Concepts with problems	1
4.4	Beams subjected to uniaxial and biaxial bending- Concepts with problems	1
4.5	Design of plate girders- Concepts with problems	1
4.6	Design of plate girders- Solve the	1
4.7	Intermediate and bearing stiffeners- Concepts with problems	1
4.8	Flange and web splices- Concepts with problems	2
5	**ROOF TRUSSES AND INDUSTRIAL STRUCTURES**	
5.1	Roof trusses	1
5.2	Roof- Concepts	1
5.3	Side coverings- Concepts	2
5.4	Design of purlin and elements of truss- Concepts	1
5.5	Design of purlin and elements of truss- Solve the problems	1
5.6	Design end bearing- Concepts	1
5.7	Design end bearing- Solve the problems	1
5.8	Design of gantry girder- Concepts	1
5.9	Design of gantry girder- Solve the problems	1

CourseDesigner

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TIRUCHENGODE - 637 215

60 CE 603	Construction Planning and Management	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To impart knowledge on construction planning.
- To make the students understand about the scheduling procedures.
- To know the cost control and monitoring in construction industry.
- To understand the quality and safety in construction.
- To gain knowledge on project information system.

Prerequisite

Nil

Course Outcomes

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

CO1	Study about the Choice of Technology and Resource Requirements for Work Activities	Remember, Understand, Apply
CO2	Recognize the construction planning schedules, crashing and time cost tradeoffs.	Remember, Understand, Apply
CO3	Examine the cost of the project, control the cost of the project by creating cash flows and budgeting.	Remember, Understand, Apply
CO4	Recall the quality control and safety in construction.	Remember, Understand, Apply
CO5	Acquire knowledge about project information system.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		2		2	2			1	1	3
CO2	3	2	3	2		2	2			1		3
CO3	3	2	2	3		2	3			1	1	3
CO4	3	1				2	3	2		2		3
CO5	3	1				2	3			1	1	3
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE 603 Construction Planning and Management								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Construction Planning* Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems	**[09]**
Scheduling Procedures and Techniques** Introduction – preparation of Network – Network analysis – Activity and Event oriented network - Construction Schedules – Critical Path Method and PERT – Scheduling Calculations – Float – Presenting Project Schedules – Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations – Crashing and Time/Cost Tradeoffs – Application of software in project management.	**[09]**
Cost Control, Monitoring and Accounting* The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows –Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.	**[09]**
Quality Control and Safety during Construction* Introduction to quality; Importance of quality; Quality transition – quality control and inspection, quality assurance, total quality management - Planning and control of quality during design of structures - Quality and Safety Concerns in Construction – Organizing for Quality and Safety –- Concept of Safety in Construction Industry, Importance of Construction Safety, Safety Benefits to Employers, Employees and Customers, Construction Safety Problems, Approaches to improve Construction Safety.	**[09]**
Organization and use of Project Information* Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.	**[09]**
Total Hours	**45**

Textbook(s):

1.	Chitkara, K.K. “Construction Project Management Planning”, Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 2008
2.	Moder.J. C.Phillips and Davis, “Project Management with CPM”, PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 2013.

Reference(s):

1.	Raina, C.M. “Construction Management and Practice.” Tata McGraw-Hill, 2015
2.	Srinath,L.S., “Pert and CPM Principles and Applications “, Affiliated East West Press, 2014
3.	Halpin, D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 2016.
4.	Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 2016.

SDG: 4 Quality Education* , 9 Industry, Innovation and infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Construction Planning**	**9**
1.1	Basic Concepts in the Development of Construction Plans	1
1.2	Choice of Technology and Construction Method	2
1.3	Work Tasks	1

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1.4	Defining Precedence Relationships among Activities	2
1.5	Estimating Activity Durations	1
1.6	Estimating Resource Requirements for Work Activities	1
1.7	Coding Systems	1
2	**Scheduling Procedures and Techniques**	**9**
2.1	Introduction about scheduling procedures	1
2.2	Network analysis	1
2.3	Activity and Event oriented network	1
2.4	Critical Path Method and PERT	2
2.5	Scheduling Calculations	1
2.6	Use of Advanced Scheduling Techniques	1
2.7	Crashing and Time/Cost Tradeoffs	1
2.8	Application of software in project management.	1
3	**Cost Control and Monitoring and Accounting**	**9**
3.1	Introduction to cost control and Accounting	1
3.2	Project Budget	1
3.3	Forecasting for Activity Cost Control	1
3.4	Financial Accounting Systems and Cost Accounts	1
3.5	Control of Project Cash Flows	1
3.6	Schedule Control	1
3.7	Schedule and Budget Updates	1
3.8	Relating Cost and Schedule Information	1
4	**Quality Control and Safety during Construction**	**9**
4.1	Introduction to quality and Importance of quality	1
4.2	Quality control, inspection and assurance	2
4.3	Planning and control of quality during design of structures	1
4.4	Quality and Safety Concerns in Construction	1
4.5	Concept of Safety in Construction Industry	1
4.6	Importance of Construction Safety	1
4.7	Safety Benefits to Employers, Employees and Customers	1
4.8	Approaches to improve Construction Safety.	1
5	**Organization and use of Project Information**	**9**
5.1	Types of Project Information	1
5.2	Accuracy and Use of Information	1
5.3	Computerized Organization and Use of Information	1
5.4	Organizing Information in Databases	1
5.5	Relational Model of Databases	1
5.6	Other Conceptual Models of Databases	1
5.7	Centralized Database Management Systems	1
5.8	Databases and Applications Programs	1
5.9	Information Transfer and Flow.	1
	Total	**45**

Course Designer

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60 CE 604	Hydrology and Water Resources Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objective

- To develop basic understanding about different components of hydrologic cycle
- To learn the concepts of hydrograph and groundwater hydraulics
- To impart knowledge on various irrigationmethods and crop water requirements
- To create understanding about features of various types of dams and reservoirs
- To understand the techniques offlood and drought management

.Prerequisite

Fundamentals of Mathematics and knowledge of fluid mechanics

Course Outcomes

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

CO1	Demonstrate various components of hydrologic cycle.	Remember/ Understand/ Analyse/Apply
CO2	Analyze the hydrograph and groundwater hydraulics. .	Remember/ Understand/ Analyse/Apply
CO3	Summarize the irrigation methods and crop water requirements.	Remember/ Understand/ Analyse/Apply
CO4	Illustrate the types of reservoirs and dam elements.	Remember/ Understand/ Analyse/Apply
CO5	Outline the flood and drought management techniques	Remember/ Understand/ Analyse/Apply

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1		1	2			1			2	1
CO2	3	2	1	2		1	2			1			2	2
CO3	3	1				1				1			1	1
CO4	3	1				1	3	3	3	1	3		1	1
CO5	3	2	1	2	1	1	2			1			1	2

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem. Examination (Marks)
	1	2		
Remember	08	06	15	15
Understand	20	20	15	15
Apply	20	24	50	50
Analyse	12	10	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE 604- Hydrology and Water Resources Engineering								
B.E. Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Precipitation ***

Introduction, Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method, Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method. **[09]**

Hydrograph and Groundwater Hydraulics*

Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, S- hydrograph, Flow duration curve, Groundwater: Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test, Sea water intrusion. **[09]**

Irrigation Methods ***

Definition, Advantages and Necessity, Methods of Irrigation, Surface Irrigation, Sub surface Irrigation, Micro-Irrigation, Soil moisture and Crop water relationship, Factors governing Consumptive use of water, Principal Indian crops, their season and water requirement– duty, delta, irrigation efficiency. **[09]**

Reservoirs and Dams *

Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control. Introduction to Dams, types of dams, spillways and ancillary works, Site assessment and selection of type of dam, Information about major dams and reservoirs of India. **[09]**

Flood and Drought Management **

Definition and causes of floods and droughts – Design flood, Flood estimation, frequency analysis – flood control measures – drought indices - drought prone area programme – artificial recharge – rain water harvesting**** **[09]**

Total Hours: 45

Text book(s):

1	P.N. Modi, "Irrigation Water Resources and Water Power Engineering", Standard Book House, New Delhi, 11th Edition, 2020.
2	B.C. Punmia, P.B.B. Lal,A.K. Jain and A.K. Jain, "Irrigation and Water Power Engineering", Standard Publishers, 17th Edition, 2021.

Reference(s):

1	K. Subramanya, "Engineering Hydrology", Tata McGraw Hill Pub. Co., New Delhi, 5th Edition, 2020.
2	H M Raghunath, "Hydrology: Principles, Analysis and Design", New Age International,4th Edition, 2022.
3	https://nptel.ac.in/courses/105101214

*SDG – 06:Clean Water and Sanitation , ** SDG – 11:Sustainable Cities and Communities,
***SDG – 13 - Climate Action,, ****SDG – 09 : Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**PRECIPITATION**	
1.1	Hydrology – Definition and Applications Hydrologic cycle	1
1.2	Climate and water Availability, Water Balance Equation	1
1.3	Forms and Types of Precipitation, Measurement of Rainfall	1
1.4	Estimate of missing rainfall data - Problems	1
1.5	Evaporation and its measurement and Pan Coefficient	1
1.6	Evapotranspiration and its measurement – Penman Monteith Method	1

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1.7	Infiltration – Definition , Factors affecting infiltration	1
1.8	Horton's Equation and Green Ampt Method	1
1.9	Infiltrometers and Infiltration Indices	1
2	**HYDROGRAPH AND GROUNDWATER HYDRAULICS**	
2.1	Hyetograph, Runoff – Classification, Process and Factors affecting, Drainage Basin Characteristics	1
2.2	Hydrograph – Concepts, Assumptions and Limitations of unit Hydrograph	1
2.3	Problems on Unit Hydrograph	1
2.4	S Hydrograph and Flow duration Curve	1
2.5	Groundwater Occurrence : Aquifers and its types, Darcy's Law	1
2.6	Well Hydraulics, Well losses	1
2.7	Yield of an well – Pumping test and Recuperation Test	1
2.8	Problems on Yield of well	1
2.9	Sea Water Intrusion	1
3	**IRRIGATION METHODS**	
3.1	Irrigation - Definition, Advantages and Necessity	1
3.2	Methods of Irrigation - Surface Irrigation, Subsurface Irrigation and Micro- Irrigation	1
3.3	Soil moisture and Crop water relationship - Problems	2
3.4	Consumptive use, Factors governing Consumptive use of water	1
3.5	Principal Indian crops, their season and water requirement	1
3.6	Duty and Delta – Relationship and Problems	2
3.7	Irrigation efficiency and its types - Problems	1
4	**RESERVOIRS AND DAMS**	
4.1	Reservoirs - Types, Investigations and Site selection	1
4.2	Zones of storage, Safe yield	1
4.3	Determination of Reservoir capacity – Mass curve method	2
4.4	Reservoir sedimentation and control	1
4.5	Introduction to Dams, types of dams	1
4.6	Structure of the dam – Spillway and ancillary works	1
4.7	Site assessment and selection of type of dam	1
4.8	Information about major dams and reservoirs of India.	1
5	**FLOOD AND DROUGHT MANAGEMENT**	
5.1	Definition and causes of floods and droughts	1
5.2	Design flood – Definition and Terms	1
5.3	Estimation of peak flood and Frequency Analysis - Problems	2
5.4	Flood control measures – Structural and Non structural	2
5.5	Drought indices, drought prone area programme	1
5.6	Artificial recharge – Necessity, Factors Affecting and Methods	1
5.7	Rain water harvesting – Advantages, Ways and Components	1
	Total	**45**

Course Designer

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60CE6P1	Concrete and Highway Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To acquire knowledge on properties of fresh concrete
- To know the test on hardened concrete
- To impart knowledge on Non-destructive testing methods
- To understand the test on aggregates
- To learn the various test on Bitumen

Pre-requisite

Courses – Construction Materials & Practices, Concrete Technology, Materials Testing Laboratory & Highway, Railway and Airport Engineering

Course Outcomes

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

CO1	Experiment the various test on fresh concrete	Apply
CO2	Perform various test for hardened concrete	Apply
CO3	Demonstrate the different non-destructive test available for concrete	Apply
CO4	Comprehend the properties of aggregates	Apply
CO5	Identify the test available for testing bitumen	Apply

Mapping with Programme outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	3	3	2	3	2	2	2
CO2	3	3	3	3	2	3	3	2	3	2	2	2
CO3	3	2	3	3	2	2	2	2	3	2	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2	2
CO5	3	2	2	3	2	2	2	2	3	2	2	2
3- Strong; 2-Medium; 1-Low												

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List of Experiments

1. Determine the workability of conventional concrete using Slump test*****
2. Determine the workability of conventional concrete using Vee bee consistometer test*****
3. Perform L Box test for self-compacting concrete*****
4. Perform slump flow test for geopolymer concrete*****
5. Perform the compression test on concrete specimens*****
6. Determine the split tensile strength of concrete specimens*****
7. Perform the flexural test on concrete specimens*****
8. Perform the nondestructive test on concrete*****
9. Determine the aggregate impact value of given aggregates*****
10. Determine the abrasion value of given aggregate sample*****
11. Determine the flash and fire point of a given bituminous material*****
12. Determine the softening point of bitumen*****

***SDG9 – Industry Innovation and Infrastructure**

Reference(s)	
1.	IS 516 – Methods of Tests for Strength of Concrete, BIS, New Delhi
2.	IS 13311(Part 1 & 2) – Non-Destructive Testing of Concrete – Methods of Testing, BIS, New Delhi
3.	IS 1201 – 1220, Method for Testing Tar and Bituminous Materials, BIS, New Delhi

Course Designer

1. Mr.K.ANGU SENTHIL - angusenthil@ksrct.ac.in

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60 CE 6P2	Computer Aided Analysis and Design Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objective

- To learn software packages for performing analysis of structures
- To learn software packages for performing design of structures
- To analyse and design concrete structures using software packages
- To analyse and design steel structures using software packages
- To know the design concepts of different structural elements by using excel sheet.

Prerequisite

Structural Analysis Fundamentals, Understanding of Load Analysis, Reinforced Concrete Design, and Understanding of Building Codes and Standards

Course Outcomes

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

CO1	Practice software packages for analysis and design	Create
CO2	Learn to analyse a beam for various load combinations	Apply
CO3	Analyse and design of 2D RCC and Steel structures	Understand
CO4	Perform analysis and design of 3D RCC and steel structures	Understand
CO5	Prepare excel sheet for design of structural elements	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	1	1	1	3	3	3	1
CO2	3	3	3	3	3		1		2	2	2	1
CO3	3	3	3	3	3	2	1	1	3	3	3	1
CO4	3	3	3	3	3	2	1	1	3	3	3	1
CO5	3	3	3	3	1	1	1		2	1	2	1
3- Strong;2-Medium;1-Some												

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60 CE 6P2 - Computer Aided Analysis and Design Laboratory								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

ANALYSIS

Multi – storey 2D and 3D frame analysis for various loads and load combinations using software package

DESIGN

a) Design of reinforced concrete slabs, beams, columns, and footing using software package

b) Design of Trusses, steel beams and columns using software package

c) Application of Excel spread sheet for the design of structural elements

TotalHours	**60**

Reference(s):

1.	Krishnaraju N., “Structural Design and Drawing”, Orient Longman Publishers, NewDelhi, 2013.
2.	Unnikrishna Pillai, S., Devadas Menon, “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.
3.	Subramaniam.N, “Design of Steel Structures “,(As per IS 800-2007) Ist Edition, oxford university press, 2010.
4.	IS 456 - 2000 “Code of practice for Plain and Reinforced concrete”, BIS New Delhi.
5.	IS 800 – 2007, “Code of Practice for General Construction in steel”, BIS, New Delhi.

***SDG:4 Quality Education, SDG:9: Industry, innovation and infrastructure**

CourseDesigners

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60 CE 6P3	Mini Project	Category	L	T	P	Credit
		PC	0	0	4	2

Objective

- To identify the thrust areas any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundationsystem, Design of traffic intersection etc.
- To impart and improve the design capability of the student.
- To use the knowledge acquired in Civil Engineering to do a project, which allows thestudents to come up with design, expressing their ideas in a novel way.
- To submit a complete report on the design consisting of the data given, the designcalculations, specifications if any with complete set of drawings.
- To train the students in preparing project reports and to face reviews and viva voce examination

Prerequisite

Structural Analysis Fundamentals, Understanding of Load Analysis, Reinforced Concrete Design, and Understanding of Building Codes and Standards

CourseOutcomes

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

CO1	Select the broader area of research work in the field of Civil Engineering.	Create
CO2	Outline the aim and objective on the proposed area of research.	Apply
CO3	Review the appropriate literature related to the chosen topic of research.	Understand
CO4	Generate the suitable methodology which is suitable for new ideas to work on a specific topic	Understand
CO5	Summarize the results of the works carried out and prepare the entire document to produce the detailed information of the project.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	1	3	2	2	1		3			
CO2	1	1	2	3	2	1			3		1	1
CO3	2		1	3	2			1	2		1	2
CO4	1	1		1	1	3	1	2	2			
CO5	2			2	2				1		2	1
3- Strong;2-Medium;1-Some												

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60 CE 6P3 - Mini Project								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

EVALUATION PROCEDURE

The method of evaluation will be as follows**:**

1. Internal Marks : 40 marks
(Decided by conducting 3 reviews by the Project Coordinator appointed by the HOD)

2. Evaluation of Project Report : 60 marks
(Evaluated by the examiner appointed by the HOD with the approval of HOI)
Total : 100 marks

TotalHours	**60**

Reference(s):

1.	Krishnaraju N., “Structural Design and Drawing”, Orient Longman Publishers, NewDelhi, 2013.
2.	Unnikrishna Pillai, S., Devadas Menon, “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.
3.	Subramaniam.N, “Design of Steel Structures “,(As per IS 800-2007) Ist Edition, oxford university press, 2010.
4.	IS 456 - 2000 “Code of practice for Plain and Reinforced concrete”, BIS New Delhi.
5.	IS 800 – 2007, “Code of Practice for General Construction in steel”, BIS, New Delhi.

***SDG:4 Quality Education, SDG:9: Industry, innovation and infrastructure**

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60 CG 0P5	Comprehension Test*	Category	L	T	P	C	CA	ES	Total
Semester VI		CG	0	0	2	1*	100	-	100

Objectives

- To evaluate the knowledge gained in core courses relevant to the programme of study.
- To assess the technical skill in solving complex engineering problems.

Prerequisite

Fundamental knowledge in all core subjects.

Course Outcomes

Onthesuccessful completion ofthecourse, studentswill beable to

CO1	Infer knowledge in their respective programme domain.	Apply
CO2	Attend interviewsfor career progression	Apply
CO3	Exhibit professional standardsto solve engineering problems	Apply
CO3	Promote holistic approach to problem solving	Apply
CO5	Examine the competency of graduates in specific programme domain	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2					1	2	2	3
CO2	3	3	2	2					1	2	2	3
CO3	3	3	2	2					1	2	2	3
CO4	3	3	2	2					1	2	2	3
CO5	3	3	2	2					1	2	2	3
3- Strong;2-Medium;1-Some												

Assessment Pattern

The overall knowledge of the candidate in various courses he/she studied shall be evaluated with multiple choice questions.

***SDG:4- Quality Education**

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TIRUCHENGODE - 637 215

60 CE E11	SMART MATERIALS AND SMART STRUCTURES	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To give an insight into the latest developments regarding smart materials and their use in structures.
- To provide exposure with a structure which can self-adjust their stiffness with load.
- To gain knowledge and understanding of various aspects of measuring techniques
- To Recognize the functioning of sensors, actuators
- To apply the concept signal processing and control systems

Prerequisite

Basic knowledge of properties of construction materials.

CourseOutcomes

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

CO1	Discriminate the functions and response of instrumented structures and the role of effectors and actuators in smart structures.	Knowledge/ Analyse/ Apply
CO2	Apply the concept of Whetstone Bridge in strain measurement and describe the strain measuring techniques using electrical strain gauges	Knowledge/ Analyse/ Apply
CO3	Differentiate the Piezoelectric and Electro strictive Material in smart structures.	Knowledge/ Analyse/ Apply
CO4	Outline the applications of sensors and actuators in smart structures.	Knowledge/ Analyse/ Apply
CO5	Apply the concepts of data acquisition and signal processing in smart structure to minimize the realistic engineering constraint.	Knowledge/ Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	3	2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	2	2	3	2	3	2	2	2	2	3
CO4	3	2	2	3	3	2	3	3	3	3	3	3
CO5	3	2	2	3	3	2	3	3	3	3	3	3

3- Strong;2-Medium;1-Some

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)		-	-

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60 CE E11- SMART MATERIALS AND SMART STRUCTURES								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

UNIT-I INTRODUCTION* Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self-diagnosis – Signal processing consideration – Actuation systems and effectors. Application for smart materials and smart structures.	**[09]**
UNIT-II MEASURING TECHNIQUES** Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.	**[09]**
UNIT-III SENSING TECHNOLOGY** Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVDT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and distributed measurement.	**[09]**
UNIT-IV ACTUATORS** Actuator Techniques – Actuator and actuator materials – Multiplexing embedded NiTiNDL actuators. Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials. Vibration control through shape memory alloys in earthquakeresistant	**[09]**
UNIT-V SIGNAL PROCESSING AND CONTROL SYSTEMS* Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear. Case studies of smart structures in India.	**[09]**
TotalHours	**45**

Textbook(s):

1.	Brain Culshaw. “Smart Structure and Materials”, Artech House – Borton. London-2015.
2.	Srinivasan A.V, D.Michacl Mc Farland., “Smart Structures”, Cambridge University Press, New Delhi 2010.

Reference(s):

1.	Srinath S., “Experimental Stress Analysis”, Tata McGraw-Hill, New Delhi, 2010.
2.	Dally J.W & Riley W.F., “Experimental Stress Analysis”, Tata McGraw-Hill, New Delhi, 2002.
3.	Clarence W. de Silva.,“Sensors and Actuators” Taylor & Francis, 2015
4.	Data Acquisition and Signal Processing for Smart Sensors.,Nikolay V. Kirianaki, Wiley, 2002

***SDG:4 Quality Education, **SDG:9: Industry, innovation and infrastructure**

CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**INTRODUCTION**	
1.1	Introduction to Smart Materials and Structures	1
1.2	Instrumented structures functions and response	1
1.3	Sensing systems	1
1.4	Self-diagnosis	1

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1.5	Signal processing consideration	1
1.6	Actuation systems and effectors.	2
1.7	Application for smart materials and smart structures.	2
2	**MEASURING TECHNIQUES**	
2.1	Strain Measuring Techniques using Electrical strain gauges	1
2.2	Strain Measuring Techniques using Electrical strain gauges - Types	1
2.3	Strain Measuring Techniques using Electrical strain gauges: Resistance – Capacitance	1
2.4	Inductance – Wheatstone bridges – Pressure transducers	2
2.5	Load cells	2
2.6	Temperature Compensation – Strain Rosettes.	2
3	**SENSING TECHNOLOGY**	
3.1	Sensing Technology	1
3.2	Types of Sensors	1
3.3	Physical Measurement using Piezo Electric Strain measurement	1
3.4	Inductively Read Transducers	1
3.5	The LVDT – Fiber optic Techniques	1
3.6	Chemical and Bio-Chemical sensing in structural Assessment	2
3.7	Absorptive chemical sensors	1
3.8	Spectroscopes – Fibre Optic Chemical Sensing Systems and distributed measurement.	1
4	**ACTUATORS**	
4.1	Actuator Techniques	1
4.2	Actuator and actuator materials	1
4.3	Multiplexing embedded NiTiNDL actuators	1
4.4	Piezoelectric and Electrostrictive Material	1
4.5	Magnetostructure Material	1
4.6	Shape Memory Alloys – Electro orheological Fluids	2
4.7	Electromagnetic actuation – Role of actuators and Actuator Materials	1
4.8	Vibration control through shape memory alloys in earthquake resistant	1
5	**SIGNAL PROCESSING AND CONTROL SYSTEMS**	
5.1	Data Acquisition and Processing	2
5.2	Signal Processing and Control for Smart Structures	2
5.3	Sensors as Geometrical Processors	1
5.4	Signal Processing – Control System – Linear and Non-Linear.	2
5.5	Case studies of smart structures in India	1
	Total	**45**

CourseDesigners

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60 CE E12	Solid and Hazardous Waste Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the solid and hazardous waste sources, characteristics.
- To impart knowledge on waste characterization and sampling.
- To develop basic understanding about collection and transfer of solid wastes.
- To learn the processing techniques of solid wastes.
- To know the disposal methods of solid wastes

Prerequisite

Nil

Course Outcomes

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

CO1	Identify the sources, characteristics, impacts of solid wastes.	Remember, Understand, Apply
CO2	Evaluate the composition and source reduction methods.	Remember, Understand, Apply
CO3	Summarize the methods of collection and transport of solid wastes.	Remember, Understand, Apply
CO4	Outline the waste processing techniques & equipments.	Remember, Understand, Apply
CO5	Explain the disposal methods of solid wastes.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2		3	3	1		1	2	3
CO2	3	2		1		2	3			1		3
CO3	3	2	3	1		2	1		2	2	2	2
CO4	3	2		1		2	2	1		1	2	2
CO5	3	2	2	1		3	3			1	2	2
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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60 CE E12 Solid and Hazardous Waste Management								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Sources and Classification of Wastes.* Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Elements of integrated waste management - Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, lead acid batteries, electronic wastes	**[09]**
Waste Characterization* Waste generation rates - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – Waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Recycling and reuse Practical: Composition of MSW, Determination of Physical and Chemical Properties of MSW	**[09]**
Storage, Collection and Transport of Wastes* Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport	**[09]**
Waste Processing Technologies* Objectives of waste processing – material separation and processing technologies – biological & chemical conversion technologies – methods of Composting - thermal conversion technologies, energy recovery – incineration – solidification & stabilization of hazardous wastes- treatment of biomedical wastes	**[09]**
Waste Disposal* Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation	**[09]**
Total Hours	**45**

Textbook(s):

1.	George Techobanoglous et al, ‖Integrated Solid Waste Management‖, McGraw - Hill, 2014.
2.	B. B. Sundaresan, A. D. Bhide – Solid Waste Management, Collection, Processing and Disposal, Mudrashilpa Offset Printers, 2001.

Reference(s):

1.	M.N. Rao, Razia Sultana, Sri Harsa kota. “Solid and hazardous waste management” BS publications, 2019.
2.	P.R. White, M. Franke & P.Hindle. “ Integrated Solid Waste Management”, An Aspen Publication, 2018
3.	R.E.Landrefh and P.A.Rebers,‖ Municipal Solid Wastes-Problems & Solutions‖ ,Lewis, 2009
4.	George Tchobanoglous, “Handbook of Solid Waste Management, 2nd Edition” McGraw - Hill, 2017

***SDG: 3 Good health and well-being, 4 Quality Education, 13 Climate Action**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Sources and Classification of Wastes.**	**9**
1.1	Type of solid and hazardous wastes	1
1.2	Sources of solid and hazardous wastes	1
1.3	Need for solid and hazardous waste management	1
1.4	Elements of integrated waste management	1
1.5	Salient features of Indian legislations on management	1
1.6	handling of municipal solid wastes	1
1.7	hazardous wastes	1
1.8	biomedical wastes	1
1.9	Electronic wastes.	1
2	**Waste Characterization**	**9**
2.1	Waste generation rates	1
2.2	Physical and chemical properties of solid wastes	1
2.3	biological properties of solid wastes	1
2.4	Hazardous Characteristics	1
2.5	Waste sampling and characterization	1
2.6	Source reduction of wastes	1
2.7	Waste exchange and Reuse	1
2.8	Composition of MSW	1
2.9	Determination of Physical and Chemical Properties of MSW	1
3	**Storage, Collection and Transport of Wastes**	**9**
3.1	Handling and segregation of wastes at source	1
3.2	storage and collection of municipal solid wastes	1
3.3	Analysis of Collection systems	2
3.4	Need for transfer and transport	1
3.5	Transfer stations Optimizing waste allocation	1
3.6	storage, labeling and handling of hazardous wastes	2
3.7	hazardous waste manifests and transport	1
4	**Waste Processing Technologies**	**9**
4.1	Objectives of waste processing	1
4.2	material separation and processing technologies	1
4.3	biological & chemical conversion technologies	2
4.4	methods of Composting	1
4.5	thermal conversion technologies	1
4.6	Incineration and types	1
4.7	solidification & stabilization of hazardous wastes	1
4.8	treatment of biomedical wastes	1
5	**Waste Disposal**	**9**
5.1	Waste disposal options	1
5.2	Disposal in landfills	1
5.3	Landfill Classification, types and methods	2

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5.4	design and operation of sanitary landfills	1
5.5	landfill bioreactors	1
5.6	leachate and landfill gas management	1
5.7	landfill closure and environmental monitoring	1
5.8	landfill remediation	1
	Total	**45**

Course Designer

1. Dr. S. Ramesh - rameshs@ksrct.ac.in

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60CEE13	Ground Improvement Techniques	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To learn the fundamental concepts of Stress, Strain and soil Conditions.
- To know Treatment of various soil conditions.
- To evaluate the behavior of stabilization of soil.

Prerequisite

Courses – Geology, Soil Mechanics , Foundation Engineering

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Understand various types of ground improvement.	Remember/ Understand/ Analyse/Apply
CO2	Solve the dewatering techniques.	Remember/ Understand/ Analyse/Apply
CO3	Compute theDynamic compaction Vibroflotation.	Remember/ Understand/ Analyse/Apply
CO4	Describe the various methods of grouting for treated.	Remember/ Understand/ Analyse/Apply
CO5	Analyze the Soil improvement by adding materials	Remember/ Understand/ Analyse/Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	3	2	3	3	2	3	3
CO2	3	2	3	2	2	3	3	3	3	2	3	3
CO3	3	1	3	2	2	3	3	3	3	2	2	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	1	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember(Re)	05	05	15
Understand(Un)	05	05	15
Apply (Ap)	35	30	50
Analyse (An)	15	20	20
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE E13- Ground Improvement Techniques								
B.E.Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Weak Soil and Improvement Techniques*

Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditionsReclaimed soil for the land reclamation.

.**[09]**

Dewatereing**

Dewatering Techniques – Well points – Vacuum and electroosmotic methods – Seepage analysis for two – dimensional flow for fully and partially penetrated slots in homogeneous deposits – Simple cases – Design.

[09]

Insitu Treatment of Cohesionless and Cohesive Soils*

Insitu densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibroflotation, Sand compaction piles and deep compaction. Consolidation: Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques – simple design – relative merits of above methods and their limitations. **[09]**

Grouting*

Chemical, systems, operations, applications, compaction, application and limitations,plant for preparing grouting materials, jet, geometry and properties of treated soils andapplications.

[09]

Stabilization**

Soil improvement by adding materials, lime, flyash, cement and other chemicalsand bitumen, sand column, stone column, sand drains, prefabricated drains, lime column, soil lime column, stabilization of soft clay or silt with lime, bearing capacity and settlement oftreated soils, improvement in slope stability, control methods.Soil Structure Interaction and Nailing Techniques.

[09]

Total Hours: 45

Text book(s):	
1	Raj, P.P. Ground improvement techniques, Laxmi Publications, New Delhi
2	P. Purushothama Raj, Ground improvement techniques, Laxmi Publications, Bangalore.
Reference(s):	
1	Civil Engineering and Construction Review, Foundations Geosynthetics and ground improvement, Civil Engineering and Construction Review, New Delhi.
2	Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, 1994
3	Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.

***SDG:4 – Quality Education**

****SDG:9 – Industry, Innovation and Infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Weak Soil and Improvement Techniques**	
1.1	Role of ground improvement in foundation engineering	1
1.2	methods of ground improvement	2

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1.3	Geotechnical problems in alluvial soil	1
1.4	Geotechnical problems in lateritic soil	1
1.5	Geotechnical problems in black cotton soil	1
1.6	Selection of suitable ground improvement techniques based on soil conditions	2
1.7	Reclaimed soil for the land reclamation	1
2	**Dewatereing**	
2.1	Dewatering Techniques	1
2.2	Well points	1
2.3	Vacuum and electroosmotic methods	1
2.4	Seepage analysis	1
2.5	dimensional flow for fully penetrated slots in homogeneous deposits	2
2.6	dimensional flow for partially penetrated slots in homogeneous deposits	1
2.7	Simple cases	1
2.8	Design	1
3	**Insitu Treatment of Cohesionless and Cohesive Soils**	
3.1	Insitu densification of cohesion-less soils	1
3.2	Insitu densification of consolidation of cohesive soils	1
3.3	Dynamic compaction Vibroflotation	1
3.4	Sand compaction piles	1
3.5	deep compaction	1
3.6	Consolidation Overview	1
3.7	Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques	1
3.8	simple design – relative merits of above methods and their limitations	1
3.9	Combined footings (for two columns only foundations)	1
4	**Grouting**	
4.1	Classifications ofChemical systems	1
4.2	Grouting operations	2
4.3	Grouting applications	1
4.4	Compaction and Techniques	1
4.5	application and limitations	1
4.6	plant for preparing grouting materials	2
4.7	Jet Grouting	1
4.8	geometry and properties of treated soils	1
4.9	Applications of geometry and properties of treated soils	1
5	**Stabilization**	
5.1	Introduction to Soil improvement by adding materials.	1
5.2	improvement adding materials like lime, fly ash, cement	2
5.3	improvement adding materials like chemicalsand bitumen	1
5.4	sand column, stone column, sand drains, prefabricated drains	1
5.5	soil lime column	1
5.6	stabilization of soft clay or silt with lime	1
5.7	bearing capacity and settlement oftreated soils	1

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5.8	improvement in slope stabilitycontrol methods	1
5.9	.Soil Structure Interaction and Nailing Techniques.	1

List of MATLAB Programmes:

1. Introduction to MATLAB for Ground Improvement Techniques.
2. Matrix Operations foralluvial soil and lateritic
3. Solution of system forpreparing grouting materials.
4. Computation of values for Soil improvement by adding materials.
5. Finding bearing capacity and settlement of treated soils.
6. Solving Sand compaction piles using differential equations.
7. Computing Maxima and Minima of Dynamic compaction Vibroflotation.
8. Computing dimensional flow for fully penetrated slots in homogeneous deposits.

Course Designers

Dr.D.Sivakumar - sivakumard@ksrct.ac.in

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60CEE14	Traffic Engineering and Management	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To impart the fundamental knowledge about traffic engineering
- To acquire knowledge in traffic survey
- To learn the fundamental knowledge of traffic design and visual aids
- To acquire knowledge in traffic safety and environment
- To know various traffic management techniques

Prerequisite

Basic knowledge of highway and railway engineering

Course Outcomes

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

CO1	Infer the fundamental concepts of traffic engineering	Knowledge/ Analyse/ Apply
CO2	Demonstrate the survey of traffic parameters and highway capacity LOS	Knowledge/ Analyse/ Apply
CO3	Design channels, intersections, signals, roundabouts and parking arrangements	Knowledge/ Analyse/ Apply
CO4	Understand the traffic signs, markings and road safety and the environmental impacts	Knowledge/ Analyse/ Apply
CO5	Summarize the traffic planning and management systems	Knowledge/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	2	3	3	2	1	1		2
CO2	2	1	1	1	2	3	3	2	1	1		2
CO3	2	1	1	1	2	3	3	2	1	1		2
CO4	2	1	1	1	2	3	3	2	1	1		2
CO5	2	1	1	1	2	3	3	2	1	1		2
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	30	30	50
Apply (Ap)	20	20	30
Analyse (An)	10	10	20
Create (Cr)		-	-

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K.S.Rangasamy College of Technology–Autonomous					R 2022			
60 CE E14 - Traffic Engineering and Management								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Fundamentals of Traffic Engineering* ** Scope of Traffic Engineering – Elements of Traffic Engineering – Road user, vehicle and road way. Road Characteristics – Road user characteristics – PIEV theory – Vehicle characteristics – IRC standards – Design speed, volume – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India.	**[09]**
Traffic Surveys and Level of Service* ** Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Origin Destination Survey – Parking Survey – Accident analysis – Statistical applications in traffic studies and traffic forecasting – Level of service – Highway capacity – Capacity of urban and rural roads – PCU concept and its limitations – Traffic Flow theory.	**[09]**
Traffic Design and Visual Aids* ** Design of at-grade intersections – Principles of design – Channelization – Design of rotaries – Traffic signals - pre-timed and traffic actuated – Design of signal setting – phase diagrams – timing diagram – Signal co-ordination – Roundabouts – Grade separated intersections – Geometric elements for divided and access controlled highways and expressways.	**[09]**
Traffic Safety and Environment* ** Road furniture – Street lighting – Traffic signs including Variable Message Sign and road markings – Networking pedestrian facilities & cycle tracks – Traffic regulation and control Traffic Safety – Principles and Practices – Road Safety Audit – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures.	**[09]**
Traffic Management* ** Area Traffic Management System – Traffic System Management (TSM) with IRC standards – Traffic Regulatory Measures -Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods – Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education – Car pooling.	**[09]**
TotalHours	**45**

Textbook(s):

1. Kadiyali L.R., "Traffic Engineering and Transport Planning", 9th Edition, Khanna Publishers, Delhi, 2017.
2. Srinivasa Kumar, Introduction to Traffic Engineering, Universities Press, 2018

Reference(s):

1. Khanna S. K, and others, Highway Engineering, Nam Chand & Bros, Roorkee, 2014, Pages 177 – 308.
2. Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, “Principles of Highway Engineering and Traffic Analysis”, Wiley, 2011.
3. O’ Flaherty C. A., “Traffic Planning and Engineering”, Elsevier India, 2006.
4. Mike Slinn, Paul Matthews, Peter Guest, “Traffic Engineering Design – Principles and Practice”, Butterworth-Heinemann, 2005.

***SDG- 4: Quality Education ** SDG - 11: Sustainable Cities and Communities**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Fundamentals of Traffic Engineering**	
1.1	Scope and elements of Traffic Engineering	1
1.2	Road user characteristics	1
1.3	PIEV theory with problems	2
1.4	Vehicle characteristics	1
1.5	IRC standards	1
1.6	Performance characteristics	1
1.7	Fundamentals of Traffic Flow	1
1.8	Urban Traffic problems in India.	1
2	**Traffic Surveys and Level of Service**	
2.1	Speed, journey time and delay surveys	1
2.2	Vehicles Volume Survey including non-motorized transport	1
2.3	Origin Destination Survey	1
2.4	Accident analysis	1
2.5	Statistical applications in traffic studies and traffic forecasting	1
2.6	Highway capacity	1
2.7	Capacity of urban and rural roads	1
2.8	Traffic Flow theory.	1
2.9	PCU concept and its limitations	1
3	**Traffic Design and Visual Aids**	
3.1	Design of at-grade intersections	1
3.2	Principles of design and Design of rotaries	1
3.3	Traffic signals and its types	2
3.4	Design of signal setting	1
3.5	Signal co-ordination	1
3.6	Grade separated intersections	1
3.7	phase and timing diagram	1
3.8	Geometric elements for divided and access controlled highways and expressways.	1
4	**Traffic Safety and Environment**	
4.1	Road furniture and Street lighting	1
4.2	Traffic signs including Variable Message Sign and road markings	2
4.3	Networking pedestrian facilities & cycle tracks	1
4.4	Traffic regulation and control Traffic Safety	1
4.5	Principles and Practices	1
4.6	Road Safety Audit	1
4.7	Traffic and environment hazards	1
4.8	Air and Noise Pollution, causes, abatement measures.	1
5	**Traffic Management**	
5.1	Area Traffic Management System	1

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5.2	Traffic System Management (TSM) with IRC standards	1
5.3	Traffic Regulatory Measures	1
5.4	Travel Demand Management (TDM)	1
5.5	Direct and indirect methods	1
5.6	Congestion and parking pricing	1
5.7	Coordination among different agencies	1
5.8	All segregation methods	1
5.9	Intelligent Transport System for traffic management, enforcement and education	1
	Total	**45**

Course Designer

1. Dr.K.Yuvaraj - yuvarajk@ksrct.ac.in

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60CEE15	CONCEPTUAL PLANNING AND BUILDING BYELAWS	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To acquire knowledge about urban planning rule.
- To gain knowledge on conceptual planning for buildings
- To know about various byelaws for building construction.
- To practice various sustainability activities for green building construction.
- To learn about previous methods using case studies.

Prerequisite

Basic knowledge about building construction, planning and rules.

Course Outcomes

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

CO1	Efficiently allocate land for residential, commercial, industrial, and recreational purposes to maximize utility and minimize sprawl.	Knowledge/ Analyse/ Apply
CO2	Plan for and develop essential infrastructure such as roads, water supply, sewage, and electricity to support the needs of the community.	Knowledge/ Analyse/ Apply
CO3	Gain knowledge about various building byelaws	Knowledge/ Analyse/ Apply
CO4	Integrate sustainable practices to minimize the environmental impact of development, including green building standards.	Knowledge/ Analyse/ Apply
CO5	Develop a plan based on past case studies.	Knowledge/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3		2	2	2	2	2	3
CO2	3	3	3	2	3	1		2	2	2	2	3
CO3	1	1	1	1	2		1	2	2	2	2	3
CO4		2			3	3		3	3	3	3	3
CO5	2	2	2	3	1		3	3	3	3	3	3

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE E15 – Conceptual Planning and Byelaws								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

INTRODUCTION TO URBAN PLANNING Definition and scope of urban planning - Historical development of urban planning - Role of urban planning in sustainable development.	**[09]**
CONCEPTUAL PLANNING Principles of conceptual planning - Land-use planning and zoning - Transportation planning - Environmental considerations in planning.	**[09]**
BUILDING BYE-LAWS Introduction to building regulations - Zoning regulations - Floor area ratio (FAR) and building density - Setback requirements.	**[09]**
URBAN DESIGN Principles of urban design - Public spaces and amenities - Streetscape design - Integration of architecture and urban design. SUSTAINABILITY IN PLANNING: Incorporating sustainability principles in urban planning - Green building concepts - Energy-efficient urban design.	**[09]**
CASE STUDIES Analysis of successful urban planning projects - Examination of building bye-laws in specific regions - Application of conceptual planning principles in real-world scenarios.	**[09]**
Total Hours	**45**

Textbook(s):

1.	Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2011.
2.	Stephen A. Kliment, Editor, 'Building Type Basics' Series, Wiley.
3.	Peter Coleman, 'Shopping Environments: Evolution, Planning and Design', Routledge, 2006.

Reference(s):

1.	N.Kumara Swamy and A.Kameswara Rao,"Building Planning and Drawing", 8th Edition, Charotar Publications, 2010.
2.	H.W. Harrison and P.M. Trotmanm, "BRE Building elements, Building service", BRE Press Publishers, 2000.
3.	B.S. Gahlot and Sanjay Sharma, "Building repair and maintenance and management", CBS Publishers, 1st Edition, 2006.

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Unit I**	
1.1	Introduction	1
1.2	Definition and scope of urban planning	1
1.3	Urban planning standards	1
1.4	Land Use Planning	2
1.5	Historical development of urban planning	2

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1.6	Role of urban planning in sustainable development.	2
2	**UNIT II**	
2.1	Principles of conceptual planning	2
2.2	Land-use planning and zoning	2
2.3	Transportation planning	2
2.4	Environmental considerations in planning	2
2.5	Housing and Residential Planning	1
3	**UNIT III**	
3.1	Introduction to building regulations	1
3.2	Thump rules	2
3.3	Zoning regulations	2
3.4	Floor area ratio (FAR) and building density	2
3.5	Setback requirements	2
4	**UNIT IV**	
4.1	URBAN DESIGN: Principles of urban design	1
4.2	URBAN DESIGN: Public spaces and amenities	1
4.3	URBAN DESIGN: Streetscape design	1
4.4	URBAN DESIGN: Integration of architecture and urban design	2
4.5	SUSTAINABILITY IN PLANNING: Incorporating sustainability principles in urban planning	2
4.6	SUSTAINABILITY IN PLANNING: Green building concepts	1
4.7	SUSTAINABILITY IN PLANNING: Energy-efficient urban design.	1
5	**UNIT V**	
5.1	Analysis of successful urban planning projects	2
5.2	Examination of building bye-laws in specific regions	2
5.3	Application of conceptual planning principles in real-world scenarios.	3
5.4	Application of conceptual planning principles in Construction Projects.	1
	Total	**45**

CourseDesigners

1. Dr.S.GUNASEKAR - gunasekar@ksrct.ac.in

R2/ w.e.f. 03.01.2024
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TIRUCHENGODE - 637 215

60 CE E16	Groundwater Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To introduce the student to the Characteristics of different aquifers.
- To make the students understand about groundwater well hydraulics.
- To understand the techniques of development and management of groundwater.
- To know the quality of groundwater and regulatory requirements.
- To impart knowledge on groundwater conservation measures.

Prerequisite

Nil

Course Outcomes

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

CO1	State the aquifer properties and its dynamics.	Remember, Understand, Apply
CO2	Solve well design and practical problems.	Remember, Understand, Apply
CO3	Demonstrate a model for groundwater management.	Remember, Understand, Apply
CO4	Describe the importance of groundwater quality concepts and legislations.	Remember, Understand, Apply
CO5	Execute the conservation measures of groundwater.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2			1	1	3
CO2	3	2	2	2		2	3			1		3
CO3	3	2	2	2		2	3			1	1	3
CO4	3	1				2	3	1		2		3
CO5	3	1				2	2			1	1	3
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE E16 Groundwater Engineering								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Hydrogeological Parameters** Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – GEC norms - Steady state flow - Darcy's Law - Groundwater Velocity –- Dupuit Forchheimer assumption – Steady Radial Flow into a Well.	**[09]**
Well Hydraulics** Unsteady state flow - Theis method - Jacob method – Chow's method – Law of Times – Theis Recovery – Bailer method – Slug method - tests - Image well theory – Partial penetrations of wells – Well losses – Specific Capacity and Safe yield - Collector well and Infiltration gallery.	**[09]**
Groundwater Management** Need for Management Model – Database for Groundwater Management – Groundwater balance study – Introduction to Mathematical model – Model Conceptualization – Initial and Boundary Condition – Calibration – Validation – Future Prediction – Sensitivity Analysis – Uncertainty – Development of a model.	**[09]**
Groundwater Quality* Ground water chemistry - Origin, movement and quality - Water quality standards – Drinking water – Industrial water – Irrigation water - Ground water Pollution and legislation - Environmental Regulatory requirements.	**[09]**
Groundwater Conservation** Artificial recharge techniques – Reclaimed wastewater recharge – Soil aquifer treatment (SAT) – Aquifer Storage and Recovery (ASR) - Seawater Intrusion and Remediation – Ground water Basin management and Conjunctive use – Protection zone delineation, Contamination source inventory and remediation schemes.	**[09]**
Total Hours	**45**

Textbook(s):

1.	Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
2.	Todd D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2011.

Reference(s):

1.	Fitts R Charles, "Groundwater Science". Elsevier, Academic Press, 2012.
2.	Bear J., "Hydraulics of Groundwater", McGrow-Hill International, 1979.
3.	Karanth KR., "Ground Water Assessment, Development & Management", Tata Mc Graw Hill Co. Ltd., New Delhi, 2004
4.	Rastogi A.K., Numerical Groundwater Hydrology, 2011.

*** SDG 6 – Clean Water and Sanitation**
**** SDG 12 – Responsible Consumption and Protection**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Hydrogeological Parameters**	**9**
1.1	Introduction	1
1.2	Water bearing Properties of Rock	1
1.3	Type of aquifers, Aquifer properties	1

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1.4	Permeability, specific yield	1
1.5	Transmissivity and storage	1
1.6	GEC norms	1
1.7	Steady state flow, Darcy's Law	1
1.8	Groundwater Velocity	1
1.9	Dupuit Forchheimer assumption, Steady Radial Flow into a Well	1
2	**Well Hydraulics**	**9**
2.1	Unsteady state flow	1
2.2	Theis method	1
2.3	Jacob method, Chow's method	1
2.4	Law of Times, Theis Recovery	1
2.5	Bailer method, Slug method, tests	1
2.6	Image well theory, Partial penetrations of wells	1
2.7	Well losses	1
2.8	Specific Capacity and Safe yield	1
2.9	Collector well and Infiltration gallery	1
3	**Groundwater Management**	**9**
3.1	Need for Management Model	1
3.2	Database for Groundwater Management	1
3.3	Groundwater balance study	1
3.4	Introduction to Mathematical model	1
3.5	Model Conceptualization, Initial and Boundary Condition	1
3.6	Calibration, Validation	1
3.7	Future Prediction	1
3.8	Sensitivity Analysis, Uncertainty	1
3.9	Development of a model	1
4	**Groundwater Quality**	**9**
4.1	Ground water chemistry	1
4.2	Origin, movement and quality	2
4.3	Water quality standards	1
4.4	Drinking water	1
4.5	Industrial water	1
4.6	Irrigation water	1
4.7	Ground water Pollution and legislation	1
4.8	Environmental Regulatory requirements	1
5	**Groundwater Conservation**	**9**
5.1	Artificial recharge techniques	1
5.2	Reclaimed wastewater recharge	1
5.3	Soil aquifer treatment (SAT)	1
5.4	Aquifer Storage and Recovery (ASR)	1
5.5	Seawater Intrusion and Remediation	1
5.6	Ground water Basin management	1
5.7	Conjunctive use	1

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5.8	Protection zone delineation	1
5.9	Contamination source inventory and remediation schemes	1
	Total	**45**

Course Designer

1. Dr. P. Mageshkumar - mageshkumarp@ksrct.ac.in

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60 CE E21	Experimental Stress Analysis	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the basics in measurements, strain gauge types, and applications
- To understand various data recording instruments
- To acquire knowledge in vibration measurement systems
- To learn different non destructive testing methods
- To gain knowledge on photo elasticity and stress separation methods

Prerequisite

Course Outcomes

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

CO1	Learn the principles of force and strain measurements	Remember, Understand, Apply
CO2	Identify suitable data recording instruments	Remember, Understand, Apply
CO3	Express the principle of vibration instruments	Remember, Understand, Apply
CO4	Apply non-destructive techniques in evaluating the structures	Remember, Understand, Apply
CO5	Perform model analysis for large scale structures.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	3	3	1	1		1	3	2	1	3	2
CO2	3	2	1	2	3	1	1	1	1	3	2	1	3	2
CO3	3	1	3	3	2	1			1	2	2		3	1
CO4	3	3	3	3	3	3	1	1	2	2	2	2	3	3
CO5	3	3	3	3	3	3	1	1	2	3	3	1	3	3
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 CE E21 - Experimental Stress Analysis								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Force and Strain Measurements** Principles of measurements, Accuracy, Sensitivity and range of measurements. Mechanical, Optical, Acoustical and Electrical extensometers and their uses, Advantages and disadvantages.	**[09]**
Data Recording** Strain gauge circuits – Potentiometer and Wheatstone bridge – use of lead wires switches etc., - Use of electrical resistance strain gauges in transducer applications – LVDT - Indicating and recording devices - Static and dynamic data recording – Data (Digital and Analogue) acquisition and processing systems.	**[09]**
Vibration Measurement** Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. - Equipment for loading - Moire's techniques - Transducers for velocity and acceleration measurements - vibration meter - Seismographs - vibration analyzer - Cathode Ray Oscilloscope.	**[09]**
Non-Destructive Testing Techniques** Non-destructive testing techniques - Load testing of structures, Buildings, bridges and towers - Acoustic emission - holography - use of laser for structural testing - Laser and Image processing Techniques -Heat thermo coupler and heat measurements.	**[09]**
Model Analysis** Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques – Photo elasticity – optics of photo elasticity – Polaris cope – Isoclinic's and Isochromatics - methods of stress separation – wind tunnel and its use in structural analysis.	**[09]**
Total Hours	**45**

Textbook(s):

1.	Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, New Delhi,1996
2.	Dally J W and Riley W.F, "Experimental stress Analysis", McGraw-Hill, Inc. NewYork, 1991

Reference(s):

1.	Rangan C S., "Instrumentation – Devices and Systems", Tata McGraw-Hill Publishing Co., Ltd., New Delhi, 1997
2.	Sirohi. R.S.,Radhakrishna.H.C, "Mechanical Measurements", New Age International (P) Ltd. 1997
3.	Charles J Hellier, Handbook of Non destructive Evaluation, Second Edition, Mc graw Hill Education,2012
4.	Ravisankar.K. and Chellappan.A., "Advanced course on Non-Destructive Testing and Evaluation of Concrete Structures" SERC, Chennai, 2007.

****SDG9:** Industry, innovation and infrastructure

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Force and Strain Measurements**	**9**
1.1	Principles of measurements.	1
1.2	Accuracy, Sensitivity and range of measurements.	3
1.3	Mechanical, Optical, Acoustical and Electrical extensometers and their uses	3
1.4	Mechanical, Optical, Acoustical and Electrical extensometers and their Advantages and disadvantages.	2

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2	**Data Recording**	**9**
2.1	Strain gauge circuits	1
2.2	Potentiometer and Wheatstone bridge	1
2.3	Use of lead wires switches etc	1
2.4	Use of electrical resistance strain gauges in transducer applications	1
2.5	LVDT	1
2.6	Indicating and recording devices	1
2.7	Static and dynamic data recording	1
2.8	Data (Digital and Analogue) acquisition and processing systems	2
3	**Vibration Measurement**	**9**
3.1	Strain analysis methods	1
3.2	Rosette analysis. Static and dynamic testing techniques	1
3.3	Equipment for loading	1
3.4	Moire's techniques	1
3.5	Transducers for velocity and acceleration measurements	1
3.6	Vibration meter	1
3.7	Seismographs	1
3.8	Vibration analyzer	1
3.9	Cathode Ray Oscilloscope	1
4	**Non-Destructive Testing**	**9**
4.1	Non-destructive testing techniques	2
4.2	Load testing of structures, Buildings, bridges and towers	1
4.3	Acoustic emission	1
4.4	Holography	1
4.5	Use of laser for structural testing	1
4.6	Laser and Image processing Techniques	1
4.7	Heat thermo coupler and heat measurements	2
5	**Model Analysis**	**9**
5.1	Laws of similitude	1
5.2	Model materials & model testing	1
5.3	Testing large scale structures	1
5.4	Holographic techniques	1
5.5	Photo elasticity – optics of photo elasticity	1
5.6	Polaris cope	1
5.7	Isoclinic's and Isochromatics	1
5.8	Methods of stress separation	1
5.9	Wind tunnel and its use in structural analysis	1
	Total	**45**

Course Designer

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60 CE E22	AIR POLLUTION MANAGEMENT	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management.
- To understand the pollutant dispersion concepts and computer models.
- To design stacks and particulate air pollution control devices to meet applicable standards.
- To manage the air pollution through preventive measures and impact assessment.
- To identify, formulate and solve air and noise pollution problems.

Prerequisite

Basic knowledge on environmental science.
60 MY 001 - Environmental Studies and Climate Change.

Course Outcomes

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

CO1	Define the sources of air pollution and sampling methods	Remember, Understand, Apply
CO2	Describe the dispersion of air pollutants	Remember, Understand, Apply
CO3	Express the particulate and gaseous pollutant control techniques	Remember, Understand, Apply
CO4	Summarize the air quality management principles	Remember, Understand, Apply
CO5	Evaluate the indoor air quality and noise pollution effects	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2			1	1	3
CO2	3	2	2	2		2	3			1		3
CO3	3	2	2	2		2	3			1	1	3
CO4	3	1				2	3	1		2		3
CO5	3	1				2	2			1	1	3
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE E22 Air Pollution Management								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Sources and Effects of Air Pollutants* Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles-air pollution episodes.	**[09]**
Dispersion of Pollutants* Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate – Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Software applications.	**[09]**
Air Pollution Control* Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries - Case Studies.	**[09]**
Air Quality Management* Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment -Air pollution management in Indian cities.	**[09]**
Indoor air quality and Noise Pollution* Sources, types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control, Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention.	**[09]**
Total Hours	**45**

Textbook(s):

1. Anjaneyulu, Y., “Air pollution: Prevention and Control Technologies”, BS Publications, Hyderabad, 2020.
2. Rao M.N. and Rao H. V. N., “Air Pollution Control”, Tata-McGraw-Hill, New Delhi, 2017.

Reference(s):

1. W.L.Heumann., “Industrial Air Pollution Control Systems”, McGraw-Hill, New York, 2001.
2. Mahajan S.P., “Pollution Control in Process Industries”, Tata McGraw-Hill Publishing Company, New Delhi, 2001.
3. Noel De Nevers, “Air Pollution Control Engineering”, Waveland Press Inc., Illinois, 2016.
4. Bhatia, S.C., “Textbook of Air Pollution and its Control”, Atlantic Press, New Delhi, 2010.

*** SDG 11 – Sustainable Cities and Communities, SDG 13 – Climate Action**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Sources and Effects of Air Pollutants**	**9**
1.1	Classification of air pollutants	1
1.2	Particulates and gaseous pollutants	1
1.3	Sources of air pollution, Source inventory	1
1.4	Effects of air pollution on human beings, materials, vegetation, animals	1
1.5	Global warming, Ozone layer depletion	1
1.6	Sampling and Analysis, Basic Principles of Sampling	1
1.7	Source and ambient sampling	1
1.8	Analysis of pollutants Principles	1
1.9	Air pollution episodes	1
2	**Dispersion of Pollutants**	**9**
2.1	Elements of atmosphere	1
2.2	Meteorological factors	1
2.3	Wind roses	1
2.4	Lapse rate	1
2.5	Atmospheric stability and turbulence	1
2.6	Plume rise	1
2.7	Dispersion of pollutants	1
2.8	Dispersion models	1
2.9	Software applications	1
3	**Air Pollution Control**	**9**
3.1	Concepts of control	1
3.2	Particulates control by gravitational & centrifugal methods	1
3.3	Particulates control by filtration & scrubbing methods	1
3.4	Electrostatic precipitation	1
3.5	Selection criteria for equipment	1
3.6	Gaseous pollutant control by adsorption & absorption	1
3.7	Gaseous pollutant control by condensation & combustion	1
3.8	Pollution control for specific major industries	1
3.9	Case Studies	1
4	**Air Quality Management**	**9**
4.1	Air quality monitoring	2
4.2	Preventive measures	1
4.3	Air pollution control efforts	1
4.4	Zoning	1
4.5	Town planning regulation of new industries	1
4.6	Legislation and enforcement	1
4.7	Environmental Impact Assessment	1
4.8	Air pollution management in Indian cities	1
5	**Indoor air quality and Noise Pollution**	**9**

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5.1	Sources, types and control of indoor air pollutants	1
5.2	Sick building syndrome types	1
5.3	Radon Pollution and its control	1
5.4	Sources of noise pollution	1
5.5	Effects	1
5.6	Assessment	1
5.7	Standards	1
5.8	Control methods	1
5.9	Prevention	1
	Total	**45**

Course Designer

1. Dr. P. Mageshkumar - mageshkumarp@ksrct.ac.in

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60 CE E23	Bridge Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the fundamental concepts of Construction of Bridges.
- To know composite bridge structures.
- To evaluate the substructure under various soil conditions.
- Understand the process of bridge management, including inspection.
- Understand and be able to calculate demands on a bridge

Prerequisite

Course Outcomes

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

CO1	Understand various types of bridges.	Remember, Understand, Apply
CO2	Improve the software techniques for various load conditions.	Remember, Understand, Apply
CO3	Compute the analysis and design of bridges.	Remember, Understand, Apply
CO4	Describe the various methods of foundation for bridges.	Remember, Understand, Apply
CO5	Evaluate the long span bridge design and construction.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3		2			3	2		3		2	3
CO2		2				2	1				3		2	3
CO3	2	2	1		1		2	2		1			2	3
CO4		3	1		3				2		3		2	3
CO5	3	2		2	3		2						2	3
3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 CE E23- Bridge Engineering								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction** Types of bridges - Materials of construction - Codes of practice (Railway and Highway Bridges) - Aesthetics - Loading standards (IRC, RDSO, AASHTO) - Recent developments box girder bridges - Historical bridges (in India and overseas). Planning and layout of bridges: Hydraulic design - Geological and geotechnical considerations - Design aids - Computer softwares- Expert systems.	**[09]**
Concrete bridges** Bridge deck and approach slabs - Slab design methods - Design of bridge deck systems - Slab-beam systems (Guyon- Massonet and Hendry Jaeger methods) - Box girder systems - Analysis and design - Detailing of box girder systems.	**[09]**
Steel and composite bridges** Introduction to composite bridges - Advantages and disadvantages - Orthotropic decks - Box girders - Composite steel-concrete bridges - Analysis and design - Truss bridges – Construction methods of Slab culverts, Simply supported bridges and cantilever bridges.	**[09]**
Sub-structure** Piers - Columns and towers - Analysis and design - Shallow and deep foundations - Caissons - Abutments and retaining walls. Bridge appurtenances: Expansion joints - Design of joints - Types and functions of bearings - Design of elastomeric bearings - Railings - Drainage system - Lighting.	**[09]**
Long span bridges:** Design principles of continuous box girders - Curved and skew bridges - Cable stayed and suspension bridges - Seismic resistant design - Seismic isolation and damping devices. Construction techniques: Cast in-situ - Prefabricated - Incremental launching - Free cantilever construction - Inspection - Maintenance and rehabilitation - Current design and construction practices.	**[09]**
Total Hours	**45**

Textbook(s):

1.	Wai-Fah Chen Lian Duan, "Bridge Engineering Handbook", CRC Press, USA, 2000.
2.	R.M. Barker and J.A. Puckett, “Design of Highway Bridges”, John Wiley & Sons, New York, 1997

Reference(s):

1.	P.P. Xanthakos, "Theory and Design of Bridges", John Wiley & Sons, New York, 1994
2.	D.J. Victor, “Essentials of Bridge Engineening,” Oxford & IBH Publishing, New Delhi, 2001
3.	N. Krishna Raju, “Design of Bridges,” Oxford & IBH Publishing, New Delhi, 1998.

****SDG9: Industry, innovation and infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Introduction**	**9**
1.1	Types of bridges &Materials of construction	1
1.2	Codes of practice (Railway and Highway Bridges)	1
1.3	Aesthetics & Loading standards (IRC, RDSO, AASHTO)	1
1.4	Recent developments box girder bridges	1

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1.5	Historical bridges (in India and overseas). Planning and layout of bridges: Hydraulic design	1
1.6	Geological and geotechnical considerations	1
1.7	Design aids	1
1.8	Computer softwares	1
1.9	Expert systems	1
2	**Concrete bridges**	**9**
2.1	Bridge deck and approach slabs	2
2.2	Slab design methods	1
2.3	Design of bridge deck systems	1
2.4	Slab-beam systems (Guyon- Massonet and Hendry Jaeger methods)	2
2.5	Box girder systems	1
2.6	Analysis and design	1
2.7	Detailing of box girder systems	1
3	**Steel and composite bridges:**	**9**
3.1	Introduction to composite bridges	1
3.2	Advantages and disadvantages (composite bridges)	1
3.3	Orthotropic decks	1
3.4	Box girders	1
3.5	Composite steel	1
3.6	concrete bridges	1
3.7	Analysis and design	1
3.8	Truss bridges	1
3.9	Construction methods of Slab culverts, Simply supported bridges and cantilever bridges.	1
4	**Sub-structure**	**9**
4.1	Piers , Columns and towers	1
4.2	Analysis and design - Shallow and deep foundations	2
4.3	Caissons ,Abutments and retaining walls	1
4.4	Bridge appurtenances, Expansion joints - Design of joints	1
4.5	Types and functions of bearings - Design of elastomeric bearings	1
4.6	Railings	1
4.7	Drainage system	1
4.8	Lighting	1
5	**Long span bridges**	**9**
5.1	Design principles of continuous box girders	1
5.2	Curved and skew bridges	1

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5.3	Cable stayed and suspension bridges	1
5.4	Seismic resistant design	1
5.5	Seismic isolation and damping devices. Construction techniques: Cast in-situ, Prefabricated ,Incremental launching	1
5.6	Free cantilever construction & Inspection	1
5.7	Maintenance and rehabilitation	1
5.8	Current design and construction practices.	2
	Total	**45**

Course Designer

1. Dr.R.Jagadeesan jagadeesan@ksrct.ac.in

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60CEE24	TRANSPORTATION PLANNING	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the principles and history of transportation planning
- To analyze transportation policies, regulations, and stakeholder roles
- To apply data analysis techniques for traffic and travel demand modeling
- To evaluate the design of transportation infrastructure and its sustainability
- To assess urban and regional transportation challenges and their impact

Prerequisite

Highway, Railway and Airport Engineering

Course Outcomes

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

CO1	Comprehend transportation planning's fundamentals: history, policies, stakeholders, sustainability	Remember/ Understand Analyse/ Apply
CO2	Develop skills to analyze data for traffic and travel demand modeling	Remember/ Understand Analyse/ Apply
CO3	Assess transport modes, challenges, and vital intermodal and sustainable choices	Remember/ Understand Analyse/ Apply
CO4	Apply urban planning, including design, management, and integration	Remember/ Understand Analyse/ Apply
CO5	Analyze networks, policies, economics, and regional sustainability	Remember/ Understand Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	3	3	2	2	3	3
CO2	3	3	3	3	3	3	3	2	2	2	3	2
CO3	3	3	3	3	3	2	3	2	2	2	3	3
CO4	3	3	3	3	2	3	3	2	2	2	3	2
CO5	3	3	3	3	2	3	3	2	2	2	3	2
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)		-	-

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K.S.Rangasamy College of Technology – Autonomous R 2022								
60 CE E24 - Transportation Planning								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to Transportation Planning* History and Evolution - Policy and Regulations - Key Stakeholders - Sustainability in Transportation - Transportation and Economic Development - Ethics in Planning - Social Considerations	**[08]**
Data Collection and Analysis* Data Collection and Methodology - Traffic Flow Theory - Travel Demand Modelling - GIS Applications - Network Analysis Techniques - Environmental Data Usage - Case Study	**[09]**
Transportation Modes* Road Transport Overview - Rail and Transit - Air and Maritime - Active Transportation - Intermodal Transport Use - Accessibility Planning - Case studies of successful transportation projects in India	**[08]**
Urban Transportation Planning* Urban Transport Issues - Public Transit Systems - Traffic Control Methods - Bike and pedestrian infrastructure planning for Indian urban areas - Land Use Integration - Intelligent Transportation System - Sustainable Urban Transport - Case Studies	**[10]**
Regional Transportation Planning* Challenges and considerations in regional transportation planning - City-rural connectivity in India Design and development of regional transport infrastructure - Integration of land use and transportation planning in regional contexts - case studies	**[10]**
Total Hours	**45**

Textbook(s):

1. Pradip Kumar Sarkar, Vinay Maitri and G. J. Joshi. " Transportation planning : principles, practices and policies." PHI Learning, 2022
2. C.S. Papacostas , P.D. Prevedouros," Transportation Engineering and Planning," Pearson Publications, 2015

Reference(s):

1. Winnie Daamen, Christine Buisson, Serge P. Hoogendoorn, Traffic Simulation and Data Validation - Methods and Applications, CRC Press, 2015
2. The Institute of Transportation Engineers, Traffic Engineering Handbook, 7th Edition, 2016
3. Meyer, Michael D, ITE Transportation Planning Handbook, John Wiley & Sons 2016
4. IRC-SP41: Guidelines for the Design of At-Grade Intersections in Rural & Urban Areas

***SDG9 – Industry Innovation and Infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Introduction to Transportation Planning**	
1.1	Introduction to the course, History and Evolution	1
1.2	National and regional transportation policies & Legal and regulatory aspects in transportation	1
1.3	Key Stakeholders - Government agencies, private sector, and NGOs	1
1.4	Sustainability in Transportation - Environmental considerations	2
1.5	Transportation and Economic Development	1
1.6	Ethics in Planning	1
1.7	Social Considerations	1

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2	**Data Collection and Analysis**	
2.1	Data sources and methods	1
2.2	Traffic behavior	1
2.3	Modeling traffic flow	1
2.4	Travel demand modeling - Concepts and techniques & Forecasting travel demand	2
2.5	Geographic Information Systems in planning	1
2.6	Spatial analysis in transportation	1
2.7	Route planning and optimization	1
2.8	Network connectivity in transportation	1
3	**Transportation Modes**	
3.1	Road network planning and design	1
3.2	Rail systems and transit modes	1
3.3	Mass transit systems and urban rail	1
3.4	Air transport in India	1
3.5	Maritime and inland water transport	1
3.6	Walking and cycling infrastructure	1
3.7	Non-motorized transport	1
3.8	Interconnected transport modes & Seamless mobility in transportation	1
4	**Urban Transportation Planning**	
4.1	Urbanization and traffic congestion	1
4.2	Urban transport challenges - Environmental and social issues	1
4.3	Public transit systems - Design and operation	2
4.4	Public transit systems - Challenges and improvements	1
4.5	Traffic management and control- Traffic signal systems	1
4.6	Intelligent Transporation system	1
4.7	Walkability and bike lanes & Non-motorized transport in urban areas	1
4.8	Transit-oriented development & Mixed-use planning in urban areas	1
4.9	Case Studies	1
5	**Regional Transportation Planning**	
5.1	Regional connectivity - Connecting cities and rural areas	1
5.2	Regional transport networks	1
5.3	Rural transport needs - Challenges and solutions	1
5.4	Rural accessibility and mobility	1
5.5	Regional transport infrastructure design Development and expansion	1
5.6	Regional policy framework - Government regulations & Funding and financing mechanisms	2
5.7	Economic and social impact - Regional development and growth	1
5.8	Case studies and regional success stories	2
	Total	**45**

Course Designer

1. Mr.K.ANGU SENTHIL - angusenthil@ksrct.ac.in

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60CEE25	CONSTRUCTION TECHNIQUES AND EQUIPMENTS	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To acquire knowledge about techniques adopted in modern construction.
- To impart the fundamental knowledge about building components and construction techniques.
- To gain knowledge in construction sequence & practices.
- To know various equipment used in construction industry.
- To learn about equipment management for various construction works.

Prerequisite

Basic knowledge about building materials and machineries.

CourseOutcomes

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

CO1	Associate the knowledge of construction of sub structures and superstructures.	Knowledge/ Analyse/ Apply
CO2	Analyse the techniques for erection of construction units.	Knowledge/ Analyse/ Apply
CO3	Understand basic knowledge about construction equipment.	Knowledge/ Analyse/ Apply
CO4	Discuss about construction, hauling and conveying equipment.	Knowledge/ Analyse/ Apply
CO5	Learn the knowledge about various concrete production equipment.	Knowledge/ Analyse/ Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	3	2	3	2	3	2	2	2	2	2	2	3
CO3	3	2	1	2	2	2	3	2	2	2	2	3
CO4	2	2	2	3	3	2	3	3	3	3	3	3
CO5	2	2	2	3	1	2	3	3	3	3	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)	-	-	-

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K.S. Rangasamy College of Technology–Autonomous								R2022
60 CE E25 - Construction Techniques and Equipments								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

SUB STRUCTURE* Digging and excavation of trenches–drilling and blasting techniques, pile driving techniques and sinking of wells. SUPER STRUCTURE: Masonry works - Concrete and reinforced concrete works: formwork, reinforcement and concreting – mechanized methods for erection of Buildings and installations. Cast-in-situ and pre-cast concrete. Concreting below ground level, under water concreting.	**[09]**
ERECTION OF CONSTRUCTION UNITS* Different types of scaffolding, Tunneling techniques, Pre-cast and prefabricated construction – need and advantages. Modular construction –I.S. recommendations for modular planning, standardization, mass production and transportation, Tunnel boring machine.	**[09]**
CONSTRUCTION EQUIPMENT AND MACHINERY* Earthmoving Equipment-Power shovels, Back hoe, Dragline, Clam shell; tunneling machine-types. EXCAVATING EQUIPMENT: Scraper, Bulldozer. COMPACTING EQUIPMENT: Smooth wheel roller sheep-foot roller – Pneumatic typed rollers, paving technology, slip form technique.	**[09]**
CONSTRUCTION EQUIPMENT* Hoisting equipment–such as hoist winch, hoisting chains, hooks and slings, various types of cranes – Tower crane, mobile crane and derric crane, performance and safety in operation. HAULING EQUIPMENT: Transit mixers and dumpers. CONVEYING EQUIPMENT: Belt Conveyors, Screw conveyor, Bucket conveyor.	**[09]**
CONCRETE PRODUCTION EQUIPMENT* Concrete mixers, truck mixers, pneumatic concrete placer, concrete vibrators. Pile Driving Equipment - Tunneling and rock drilling equipment – Pumps and dewatering equipment, pile and Diapharm walls, drilling techniques.	**[09]**
TotalHours	**45**

Textbook(s):

1.	R.K.Gupta," Civil Engineering Materials and Practices", Jain Brothers, New Delhi,2014
2.	Rangwala, "Engineering Materials",Charotar Publishing House Pvt., Ltd., Gujarat, 2019
3.	S.Seetharaman, "Construction Engineering and Management", 4thEdition, Umesh publications, New Delhi, 1999.

Reference(s):

1.	Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2012
2.	Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015
3.	Rajput R K., "Engineering Materials", S Chand and Company Ltd., 2014
4.	IS 1597 Part 1 & 2 ."Construction of Stone Masonry- Code of Practice" , BIS, New Delhi

***SDG:4 Quality Education, SDG:9: Industry, innovation and infrastructure**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Unit I**	
1.1	Digging and excavation of trenches	1
1.2	Drilling and blasting techniques	1
1.3	Pile driving techniques	1
1.4	Pile driving techniques and Sinking of wells	1
1.5	Masonry works	1
1.6	Formwork – reinforcement - concreting	1
1.7	Mechanized methods for erection of buildings and installations	1
1.8	Cast-in-situ and pre-cast concrete	1
1.9	Concreting below ground level, under water concreting	1
2	**UNIT II**	
2.1	Different types of scaffolding	1
2.2	Tunneling techniques	1
2.3	Pre-cast and prefabricated construction	1
2.4	Modular construction	1
2.5	I.S. recommendations for modular planning	1
2.6	Standardization	1
2.7	Mass production	1
2.8	Transportation	1
2.9	Tunnel boring machine.	1
3	**UNIT III**	
3.1	Earthmoving Equipment - Power shovels, Back hoe	1
3.2	Earthmoving Equipment - Dragline, Clam shell	1
3.3	Tunneling machine-types	1
3.4	Tunneling machine-types	1
3.5	Excavating Equipment: Scraper, Bulldozer.	1
3.6	Compacting Equipment: Smooth wheel roller and sheep foot roller	1
3.7	Compacting Equipment: Pneumatic typed rollers	1
3.8	Paving technology	1
3.9	Slip form technique	1
4	**UNIT IV**	
4.1	Hoisting equipment	1
4.2	Cranes –Tower crane	1
4.3	Cranes –Mobile crane	1
4.4	Cranes – Derric crane	1
4.5	Performance and safety in operation - cranes	1
4.6	Transit mixers and dumpers	1
4.7	Belt Conveyors	1
4.8	Screw conveyor	1
4.9	Bucket conveyor	1

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5	**UNIT V**	
5.1	Concrete mixers	1
5.2	Truck mixers	1
5.3	Pneumatic concrete placer	1
5.4	Concrete vibrators	1
5.5	Pile Driving Equipment	1
5.6	Tunneling and rock drilling equipment	1
5.7	Pumps and dewatering equipment	1
5.8	Pile and Diapharm walls	1
5.9	Drilling techniques.	1
	Total	**45**

CourseDesigners

1. Dr.S.GUNASEKAR - gunasekar@ksrct.ac.in

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60CEE26	Water Resources Systems Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To develop an understanding of systems analysis and apply to problems in Water Resources Engineering
- To learn how to apply various methods of water resources economics to problems in Water Resources Engineering
- To know about surface and sub-surface water quality management
- To learn the legal aspects of water and environment systems
- To introduce the student to the concept of Mathematical approaches for managing the water resources system.

.

.Prerequisite

Course Outcomes

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

CO1	Apply concepts of systems analysis for planning of water resources systems and minor levels	Remember/ Understand/ Analyse/Apply
CO2	Perform basic economic analysis between alternate water resources perform basic.	Remember/ Understand/ Analyse/Apply
CO3	Apply knowledge for practical implementation of water resources system related solutions in field	Remember/ Understand/ Analyse/Apply
CO4	Evaluate the economic feasibility of water resources engineering projects	Remember/ Understand/ Analyse/Apply
CO5	Develop analytical skills to formulate and solve stochastic problems for decision making under uncertainty	Remember/ Understand/ Analyse/Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	3	2	3	3	2	3	3
CO2	3	3	3	2	2	3	3	3	3	2	3	3
CO3	3	3	3	2	2	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	10	10	15
Understand	10	10	15
Apply	10	10	30
Analyse	10	10	30
Evaluate	10	10	10
Create	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE E26 - Water Resources Systems Engineering								
B.E.Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

INTRODUCTION*: Planning, Meaning and Significance. Need for water resources systems planning, Issues in planning. Planning process. **[09]**

PLANNING FOR WATER RESOUCES DEVELOPMENT*: Statement of objectives. Data requirements. Project formulation. Environmental considerations in planning, Systems analysis. Pitfalls in project planning. Conservation and augmentation of water resources. Multipurpose projects. Functional requirements in multi-purpose project. Compatibility of multipurpose uses. **[09]**

WATER RESOURCES SYSTEMS*: Concepts of systems engineering in water resources. Objective function, Production function and optimality conditions. Linear, non-linear and dynamic programming, Sensitivity analysis, Stochastic models, Statistical decision theory. Application of water resources systems engineering to practical problems. . **[09]**

ECONOMIC ANALYSIS OF WATER RESOURCES SYSTEM:** Principles of Engineering Economy, Capital, Interest and Interest Rates, Time Value of Money, Depreciation, Benefit Cost Evaluation, Discounting Techniques, Economic and Financial Evaluation, Socio-Economic Analysis. **[09]**

ADVANCED OPTIMIZATION TECHNIQUES**
Integer and parametric linear programming - Goal programming models with applications Discrete differential dynamic programming and incremental dynamic programming - Linear decision rule models with application - Stochastic dynamic programming models **[09]**

Total Hours: 45 hours

Text book (s):

1.	Chaturvedi. M.C., Water Resources Systems Planning and Management. Tata McGrawHill, New Delhi, 1997
2.	Goodman Alvin S., Principles of Water Resources Planning, Prentice Hall Inc., Englewood Cliffs, New Jersey, 1995.

Reference (s) :

1.	Hall. W.A. and Dracup, J.A. (1975), "Water Resources Systems", Tata McGraw Hill Pub. N Delhi
2.	Vedula S and P P Mujumdar., (2005) Water Resources System Analysis' by McGraw Hill Company Ltd.
3.	James D and R. Lee (2005), Water Resources Economics' Oxford Publishers.
4.	Wagner H.M.,(1993), Principles of Operations Research with Application to Management Decisions, Prentice Hall, India, New Delhi.

***SGD11 – Sustainable Cities and Communities**
**** SDG 9 – Industry Innovation and infrastructures**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**INTRODUCTION**	
1.1	Basics of Planning	1
1.2	Definition of Planning	1
1.3	Significance and importance of Planning	1
1.4	Need for water resources system.	1
1.5	Issues in Planning	1
1.6	Process of Planning	1

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2	**PLANNING FOR WATER RESOUCES DEVELOPMENT**	
2.1	Statement of objectives	2
2.2	Data requirements	1
2.3	Project formulation	1
2.4	Environmental considerations in planning	1
2.5	Pitfalls in project planning	1
2.6	Conservation and augmentation of water resources	1
2.7	Multipurpose projects	1
2.8	Functional requirements in multi-purpose project	1
2.9	Compatibility of multipurpose uses	
3	**WATER RESOURCES SYSTEMS**	
3.1	Concepts of systems engineering in water resources	1
3.2	Objectives and Function of Water Resources Systems	1
3.3	Production function of Water Resources systems	2
3.4	Linear, non-linear and dynamic programming	2
3.5	Sensitivity analysis and Stochastic models	2
3.6	Application of water resources systems engineering to practical problems. .	1
4	**ECONOMIC ANALYSIS OF WATER RESOURCES SYSTEM**	1
4.1	Principles of Engineering Economy	1
4.2	Capital, Interest and Interest Rates	1
4.3	Time Value of Money	1
4.4	Depreciation and its importance's	2
4.5	Benefits of Cost Evaluation	2
4.6	Discounting Techniques	1
4.7	Economic and Financial Evaluation	1
4.8	Socio-Economic Analysis	
5	**ADVANCED OPTIMIZATION TECHNIQUES**	
5.1	Integer and parametric linear programming	1
5.2	Goal programming models with applications	1
5.3	Discrete differential Programming	2
5.4	Incremental dynamic programming	1
5.5	Linear decision rule models with application	2
5.6	Stochastic dynamic programming models	1
5.7		1
	Total	**45**

CourseDesigners

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60 CE L01	Waste Management Techniques	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To provide knowledge on various sources of wastes.
- To gain knowledge on various waste characterization techniques and its analysis methods.
- To know about various management concepts of wastes from various sources.
- To analyze different waste processing technologies.
- To learn about various disposal methods with its remediation techniques.

Prerequisite

- **Basic knowledge about types of waste and its basic properties.**

Course Outcomes

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

CO1	Study the methods of waste management system and to analyze their dra backs comparing with statutory rules.	Remember / Understand
CO2	Understand the composition and characterization of various wastes.	Understand / Apply / Analyse
CO3	Evaluate different elements of waste management concepts.	Understand / Apply
CO4	Analyze different processing technologies and to study the various methods waste to energy conversion.	Apply / Analyse
CO5	Summarize the various disposal methods with its remediation techniques.	Remember / Understa / Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3		2	2	2	2	2	3
CO2	3	3	3	2	3	1		2	2	2	2	3
CO3	1	1	1	1	2		1	2	2	2	2	3
CO4		2			3	3		3	3	3	3	3
CO5	2	2	2	3	1		3	3	3	3	3	3
3- Strong;2-Medium;1-Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	30
Understand (Un)	20	10	30
Apply (Ap)	10	20	20
Analyse (An)	10	10	20
Create (Cr)	-	-	-

R2/ w.e.f. 03.01.2024
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TIRUCHENGODE - 637 215

K.S.RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS								R2022
60 CE L01 - WASTE MANAGEMENT TECHNIQUES								
CIVIL ENGINEERING								
Semester	Hours/ Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

INTRODUCTION* Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Elements of integrated waste management and roles of stakeholders - Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, lead acid batteries, electronic wastes , plastics and fly ash – Financing waste management.	**[09]**
WASTE CHARACTERIZATION AND SOURCE REDUCTION* Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse Practical: Composition of MSW, Determination of Physical and Chemical Properties of MSW.	**[09]**
STORAGE, COLLECTION AND TRANSPORT OF WASTES* Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport.	**[09]**
WASTE PROCESSING TECHNOLOGIES* Objectives of waste processing – material separation and processing technologies – biological &chemical conversion technologies – methods and controls of Composting - thermal conversion technologies, energy recovery – incineration – solidification & stabilization of hazardous wastes-treatment of biomedical wastes.	**[09]**
WASTE DISPOSAL* Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation.	**[09]**
Total Hours	**45**

Textbook(s):

1. George Tchobanoglous and Frank Kreith, “Handbook of Solid Waste Management”, McGraw-Hill, New York, 2012.
2. M N Rao, Razia Sultana and Sri Harsha Kota, “Solid and Hazardous Waste Management”, Elsevier, 2016.
3. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Housing and Urban affairs, Government of India, New Delhi, 2016.

Reference(s):

1. Howard S Peavy, Donald R Rowe and George Tchobanoglous, “Environmental Engineering”, Tata Mcgraw Hill Publishing Co ltd., 2016.
2. Ramachandra T.V., “Management of Municipal Solid Waste”, TERI press, New Delhi, 2014.
3. Cheery PM, “Solid and Hazardous Waste Management”, CBS Publishers & Distributors, New Delhi, 2017.

*** SDG:4 Quality Education, SDG:11: Sustainable Cities and Communities**

Course Contents and Lecture Schedule

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S.No	Topic	No.of Hours
1	**INTRODUCTION***	
1.1	Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management	1
1.2	Elements of integrated waste management and roles of stakeholders	1
1.3	Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes	2
1.4	Salient features of Indian legislations on management and handling of biomedical wastes, lead acid batteries	2
1.5	Salient features of Indian legislations on management and handling of electronic wastes , plastics and fly ash	2
1.6	Financing waste management	1
2	**WASTE CHARACTERIZATION AND SOURCE REDUCTION**	
2.1	Waste generation rates and variation	1
2.2	Composition, physical, chemical and biological properties of solid wastes and Hazardous Characteristics	2
2.3	TCLP tests	1
2.4	Waste sampling and characterization plan	1
2.5	Source reduction of wastes	1
2.6	Waste exchange - Extended producer responsibility	1
2.7	Recycling and reuse Practical: Composition of MSW, Determination of Physical and Chemical Properties of MSW.	2
3	**STORAGE, COLLECTION AND TRANSPORT OF WASTES**	
3.1	Handling and segregation of wastes at source	1
3.2	Storage and collection of municipal solid wastes	1
3.3	Analysis of Collection systems	1
3.4	Need for transfer and transport	1
3.5	Transfer stations Optimizing waste allocation	2
3.6	Compatibility, storage, labeling and handling of hazardous wastes	2
3.7	Hazardous waste manifests and transport.	1
4	**WASTE PROCESSING TECHNOLOGIES**	
4.1	Objectives of waste processing	1
4.2	Material separation and processing technologies	1
4.3	Biological & chemical conversion technologies	1
4.4	Methods and controls of Composting	2
4.5	Thermal conversion technologies	1
4.6	Energy recovery – Incineration, solidification & stabilization of hazardous wastes	2
4.7	Treatment of biomedical wastes.	1
5	**WASTE DISPOSAL**	
5.1	Waste disposal options - Landfills - Landfill Classification, types and methods	2
5.2	Disposal in landfills - Site selection, design and operation of sanitary landfills, secure landfills and Landfill bioreactors	3

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5.3	Leachate and landfill gas management	1
5.4	Landfill closure and environmental monitoring	1
5.5	Rehabilitation of open dumps – landfill remediation.	2
	Total	**45**

Course Designer

1. Dr.S.GUNASEKAR - gunasekar@ksrct.ac.in

60CEL02	Climatic Changes and Adaptation Measures	Category	L	T	P	Credit
		PE	3	0	0	3

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Objectives

- To make them aware of the fundamental factors caused for global warming
- To Provides clear picture of the atmosphere and its heat transfer through various atmospheric activities.
- To impart knowledge on climatic change impacts in various sectors and its influences scaling the life standard of the influenced human society.
- To understand the role of international bodies like WMO, UNFCCC and IPCC in and adaptation measures for the sustainable earth.
- To Strongly emphasis the necessary of innovative technologies to adopt at various levels of each stage in economic growth

Prerequisite

Basic knowledge on environmental science.
60 MY 001 - Environmental Studies and Climate Change.

Course Outcomes

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

CO1	Summarize the key concepts, definitions on key perspectives of all causes for global warming.	Remember, Understand, Apply
CO2	Evaluate the mechanisms of Atmosphere and its components connected with global warming	Remember, Understand, Apply
CO3	Analyze the impact of global warming in climatic change in various fields.	Remember, Understand, Apply
CO4	Explain various international conferences on carbon emission rate on different regions of world.	Remember, Understand, Apply
CO5	Identify various mitigation and Adaptive measurement planes for climatic change	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2			1	1	3
CO2	3	2	2	2		2	3			1		3
CO3	3	2	2	2		2	3			1	1	3
CO4	3	1				2	3	1		2		3
CO5	3	1				2	2			1	1	3
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous R2022								
60CEL02- Climatic Changes and Adaptation Measures								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Earth's Climate System* Role of ozone in environment-ozone layer-ozone depleting gases-Green House Effect, Radioactive Effects of Greenhouse Gases-The Hydrological Cycle-Green House Gases and Global Warming – Carbon Cycle.	**[09]**
Atmosphere and its Components * Importance of Atmosphere-Physical Chemical Characteristics of Atmosphere - Vertical structure of the atmosphere Composition of the atmosphere-Atmospheric stability-Temperature profile of the atmosphere-Lapse rates- Temperature inversion-effects of inversion on pollution dispersion.	**[09]**
Impacts of Climate Change ** Causes of Climate change : Change of Temperature in the environment-Melting of ice Pole-sea level rise-Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of limit Change – Risk of Irreversible Changes.	**[09]**
Observed Changes and its Causes** Climate change and Carbon credits- CDM- Initiatives in India-Kyoto Protocol-Intergovernmental Panel on Climate change Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India	**[09]**
Climate Change Mitigation and Adaptation Measures** Difference between climate change mitigation and adaptation: Mitigation: Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India. Adaptation measures include: using scarce water resources more efficiently; adapting building codes to future climate conditions and extreme weather events; building flood defenses and raising the levels of dykes; developing drought-tolerant crops; choosing tree species and forestry practices etc.	**[09]**
Total Hours	**45**

Textbook(s):

1. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2017.
2. A report on "Adaptation and mitigation of climate change-Scientific Technical Analysis", Cambridge University Press, Cambridge, 2016.

Reference(s):

1. J M Wallace and P V Hobbs "Atmospheric Science", Elsevier / Academic Press, 2016
2. Jan C Van Dam, "Impacts of Climate Change and Climate Variability on Hydrological Regimes", Cambridge University Press, 2013.
3. Uitto et al, "Evaluating Climate Change Action for Sustainable Development", Open access Book, Springer link, 2017.
4. E Thomas, Dow, Kristin and Dowin, "The atlas of Climatic change :mapping the world's greatest challenge" University of California press, Berkeley, 2019.

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Earth's Climate System**	**9**
1.1	Introduction to earth climate system	1
1.2	Role of ozone in environment	1
1.3	ozone layer	1
1.4	ozone depleting gases	1
1.5	Green House Effect	1
1.6	Radioactive Effects of Greenhouse Gases	1
1.7	The Hydrological Cycle	1
1.8	Green House Gases and Global Warming	1
1.9	Carbon Cycle.	1
2	**Atmosphere and its Components**	**9**
2.1	Introduction about atmosphere and its components	1
2.2	Importance of Atmosphere	1
2.3	Physical Chemical Characteristics of Atmosphere	1
2.4	Vertical structure of the atmosphere	1
2.5	Composition of the atmosphere	1
2.6	Atmospheric stability	1
2.7	Temperature profile of the atmosphere	1
2.8	Lapse rates	1
2.9	Temperature inversion and effects of inversion on pollution dispersion.	1
3	**Impacts of Climate Change**	**9**
3.1	Causes of Climate change	1
3.2	Change of Temperature in the environment	1
3.3	Melting of ice Pole	1
3.4	sea level rise and Impacts of Climate Change on various sectors	1
3.5	Agriculture, Forestry and Ecosystem	1
3.6	Water Resources	1
3.7	Human Health,. Industry, Settlement and Society	1
3.8	Methods and Scenarios and Projected Impacts for Different Regions	1
3.9	Uncertainties in the Projected Impacts of limit Change and Risk of Irreversible Changes.	1
4	**Observed Changes and its Causes**	**9**
4.1	Climate change and Carbon credits	1
4.2	CDM- Initiatives in India	1
4.3	Kyoto Protocol	1
4.4	Intergovernmental Panel on Climate change	1
4.5	Climate Sensitivity and Feedbacks	1
4.6	The Montreal Protocol	1
4.7	UNFCCC – IPCC	1
4.8	Evidences of Changes in Climate and Environment	1

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4.9	Global Scale and in India	1
5	**Climate Change Mitigation and Adaptation Measures**	**9**
5.1	Difference between climate change mitigation and adaptation and Carbon Trading and examples of future Clean Technology	1
5.2	Biodiesel, Natural Compost and Eco- Friendly Plastic	1
5.3	Alternate Energy – Hydrogen ,Bio-fuels, Solar Energy , Wind and Hydroelectric Power	3
5.4	Mitigation Efforts in India	1
5.5	Adaptation measures include: using scarce water resources more efficiently and adapting building codes to future climate conditions and extreme weather events	1
5.6	building flood defenses and raising the levels of dykes	1
5.7	choosing tree species and forestry practices etc.	1
	Total	**45**

***SDG: 4 Quality Education**
****13 Climate Action**

Course Designer

1. Dr. S. Ramesh - rameshs@ksrct.ac.in

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60 CE L03	APPLICATION OF REMOTE SENSING AND GIS IN ENGINEERING	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the basic principles of Remote Sensing (RS) and sensors.
- To understand the basic operations and data types in Geographical Information System (GIS).
- To acquire knowledge on the image processing and data analysis techniques.
- To learn the applications of RS & GIS in urban planning.
- To gain knowledge on the applications of RS & GIS in agriculture, forestry and earth sciences.

Prerequisite

Basic knowledge in science.

Course Outcomes

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

CO1	Interpret the earth surface features and sensor properties in Remote Sensing (RS).	Remember, Understand, Apply
CO2	Use different data types in Geographical Information System (GIS).	Remember, Understand, Apply
CO3	Relate the image processing techniques and data analysis using RS & GIS.	Remember, Understand, Apply
CO4	Solve the problems related to urban planning using RS & GIS.	Remember, Understand, Apply
CO5	Execute the projects in agriculture, forestry and earth sciences with the help of RS & GIS.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	3				3
CO2	3	3	3	2	3	3	3	3				3
CO3	3	3	3	2	3	3	3	3				3
CO4	3	3	3	3	3	3	3	3	2	2	3	3
CO5	3	3	3	3	3	3	3	3	2	2	3	3
3 - Strong; 2 - Medium; 1 - Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	20	20	40
Understand (Un)	20	20	40
Apply (Ap)	20	20	20
Analyse (An)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 CE L03 - Application of Remote Sensing and GIS in Engineering								
Civil Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Principles of Remote Sensing * Definition – Components of remote sensing – EMR spectrum – EMR interaction with earth surface features – Platforms and sensors – Evolution of different types of satellites and their characteristics – Sensor types and properties – Resolution concepts.	**[09]**
Geographical Information System * Definition and components of GIS – GIS data types – Non-spatial data – Field and statistical data – Spatial data – Maps and map projections, aerial photographs and satellite data – Vector and raster data types – Merits and demerits – Open source software.	**[09]**
Image Processing and Data Analysis * Digital Image – Characteristics – Image pre-processing techniques – Image enhancement techniques – Classification methods – Database concepts – Image interpretation – Raster and raster data analysis – Modelling surfaces – Types of data products.	**[09]**
Applications in Urban Planning ** Urban area definition and characterization – Base map preparation – Land use classification – Land cover classification – Urban structure and patterns – Feature extraction techniques – Change detection – Sprawl detection and characterization – Mapping of urban morphology – Building typology.	**[09]**
Agriculture, Forestry and Earth Sciences *** Crop inventory mapping – Command area mapping – Estimation of soil erosion – Landslides – Forest types and density – Forest fire risk zones mapping – Geology – Geomorphology – Landforms – Targeting mineral resources – Pollution monitoring.	**[09]**
TotalHours	**45**

Textbook(s):

1.	Lillesand T, Kiefer R. & Chipman J, “Remote Sensing and Image Interpretation”, 7th Edition, John Wiley & Sons, Inc., New York, 2015.
2.	Anji Reddy M, “Text Book of Remote Sensing and Geographical Information Systems”, 4th Edition, BS Publications, Hyderabad, 2022.

Reference(s):

1.	Basudeb Bhatta, “Remote Sensing and GIS”, 3rd Edition, Oxford University Press, New York, 2021.
2.	Kang-Tsung Chang, “Introduction to Geographical Information Systems”, 9th Edition, McGraw Hill Publishing, 2019.
3.	Peter A Burrough, McDonnel RA & Lloyd CD, “Principles of GIS”, 3rd Edition, Oxford University Press, United Kingdom, 2015.
4.	Morain Stanley A, Renslow Michael S, Budge Amelia M, “Manual of Remote Sensing”, 4th Edition, American Society for Photogrammetry and Remote Sensing, USA, 2019.

*** SDG 4 – Quality Education,**
**** SDG 11 – Sustainable Cities and Communities,**
***** SDG 15 – Life on Land**

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Principles of Remote Sensing**	**9**
1.1	Definition	1
1.2	Components of remote sensing	1

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1.3	EMR spectrum	1
1.4	EMR interaction with earth surface features	1
1.5	Platforms and sensors	1
1.6	Evolution of different types of satellites and their characteristics	2
1.7	Sensor types and properties	1
1.8	Resolution concepts	1
2	**Geographical Information System**	**9**
2.1	Definition and components of GIS	1
2.2	GIS data types	1
2.3	Non-spatial data	1
2.4	Field and statistical data	1
2.5	Spatial data	1
2.6	Maps and map projections	1
2.7	Aerial photographs and satellite data	1
2.8	Vector and raster data types – Merits and demerits	1
2.9	Open source software	1
3	**Image Processing and Data Analysis**	**9**
3.1	Digital Image - Characteristics	1
3.2	Image pre-processing techniques	1
3.3	Image enhancement techniques	1
3.4	Classification methods	1
3.5	Database concepts	1
3.6	Image interpretation	1
3.7	Raster and raster data analysis	1
3.8	Modelling surfaces	1
3.9	Types of data products	1
4	**Applications in Urban Planning**	**9**
4.1	Urban area definition and characterization	1
4.2	Base map preparation	1
4.3	Land use classification	1
4.4	Land cover classification	1
4.5	Urban structure and patterns	1
4.6	Feature extraction techniques	1
4.7	Change detection – Sprawl detection and characterization	1
4.8	Mapping of urban morphology	1
4.9	Building typology	1
5	**Agriculture, Forestry and Earth Sciences**	**9**
5.1	Crop inventory mapping	1
5.2	Command area mapping	1
5.3	Estimation of soil erosion	1
5.4	Landslides	1
5.5	Forest types and density	1

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5.6	Forest fire risk zones mapping	1
5.7	Geology, Geomorphology, Landforms	1
5.8	Targeting mineral resources	1
5.9	Pollution monitoring	1
	Total	**45**

CourseDesigners

1. Dr. P. Mageshkumar - mageshkumarp@gmail.com

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60CEL04	Road safety and Planning	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand fundamental of Traffic Engineering.
- To investigate & determine the collective factors & remedies of accident involved
- To design & planning various road geometrics.
- To Determine planning and management in road safety.
- To massage the traffic system from road safety point of view.

Prerequisite

Courses –

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	State the fundamental of traffic engineering & some of the statistics methods to analysis the traffic safety.	Remember/ Understand/ Analyse/Apply
CO2	Apply the concepts of accident interrogations risk involved with measures to identity the causes are dealt. .	Remember/ Understand/ Analyse/Apply
CO3	Classify the role of road safety in planning the urban infrastructures design is discussed.	Remember/ Understand/ Analyse/Apply
CO4	Evaluate the various traffic management systems for safety & safety improvement strategies are dealt.	Remember/ Understand/ Analyse/Apply
CO5	Review the knowledge of Road Safety Audits in legal process	Remember/ Understand/ Analyse/Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	3	2	3	3	2	3	3
CO2	3	2	3	2	2	3	3	3	3	2	3	3
CO3	3	1	3	2	2	3	3	3	3	2	2	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	1	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember(Re)	05	05	15
Understand(Un)	05	05	15
Apply (Ap)	35	30	50
Analyse (An)	15	20	20
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2018
60CEL04– Road safety and Planning								
B.E.Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	60	3	40	60	100

Fundamentals of Traffic Engineering*

Basic Characteristics of Motor-Vehicle Traffic, Highway Capacity, Applications of Traffic Control Devices, Traffic Design of Parking Facilities, Traffic Engineering Studies; Statistical Methods in Traffic Safety Analysis – Regression Methods, Poisson Distribution, Chi- Squared Distribution, Statistical Comparisons**[09]**

Accident Investigations and Risk Management*

Collection and Analysis of Accident Data, Condition and Collision Diagram, Causes and Remedies, Traffic Management Measures and Their Influence on Accident Prevention, Assessment of Road Safety, Methods to Identify and Prioritize Hazardous Locations and Elements, Determine Possible Causes of Crashes, Crash Reduction Capabilities and Countermeasures, Effectiveness of Safety Design Features, Accident Reconstruction **[09]**

Road Safety in Planning and Geometric Design**

Vehicle And Human Characteristics, Road Design and Road Equipment, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care. **[09]**

Role of Urban infrastructure design in safety**

Geometric Design of Roads; Design of Horizontal and Vertical Elements, Junctions, At Grade and Grade Separated Intersections, Road Safety in Urban Transport, Sustainable Modes and their Safety**[09]**

Traffic Management Systems**

Management for Safety, Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Approach to Safety, Road Safety Improvement Strategies, ITS and Safety.**[09]**

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book(s):

1	Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2	Transportation Engineering – An Introduction, C.Jotinkhisty, B. Kent Lall

Reference(s):

1	Handbook of Road Safety measures, second Edition, Rune Elvik, Alena Hoye, TrulsVaa, Michael Sorenson
2	Road Safety by NCHRP

***SDG:4 – Quality Education**

****SDG:9 – Industry, Innovation and Infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Fundamentals of Traffic Engineering**	
1.1	Definition of Basic Characteristics of Motor	1
1.2	Vehicle Traffic, Highway Capacity	1
1.3	Applications of Traffic Control Devices	2
1.4	Traffic Design of Parking Facilities, Traffic Engineering Studies	1
1.5	Statistical Methods in Traffic Safety Analysis	1
1.6	Regression Methods, Poisson Distribution	2
1.7	Chi- Squared Distribution, Statistical Comparisons	1
2	**Accident Investigations and Risk Management**	
2.1	Collection and Analysis of Accident Data,	1

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2.2	Condition and Collision Diagram, Causes and Remedies,	1
2.3	Traffic Management Measures and Their Influence on Accident Prevention,	1
2.4	Assessment of Road Safety, Methods to Identify,	1
2.5	Prioritize Hazardous Locations and Elements,	2
2.6	Determine Possible Causes of Crashes, Crash Reduction Capabilities	1
2.7	Countermeasures, Effectiveness of Safety Design Features	1
2.8	Accident Reconstruction	1
3	**Road Safety in Planning and Geometric Design**	
3.1	Vehicle And Human Characteristics	1
3.2	Road Design and Road Equipment	1
3.3	Redesigning Junctions, Cross Section Improvements	1
3.4	Reconstruction and Rehabilitation of Roads	1
3.5	Road Maintenance, Traffic Control,	1
3.6	Vehicle Design and Protective Devices	2
3.7	Post Accident Care	2
4	**Role of Urban infrastructure design in safety**	
4.1	Geometric Design of Roads	1
4.2	Design of Horizontal Elements	1
4.3	Design of Vertical Elements	1
4.4	Junctions, At Grade.	1
4.5	Grade Separated Intersections,	1
4.6	Road Safety in Urban Transport	2
4.7	Sustainable Modes and their Safety.	2
5	**Traffic Management Systems**	
5.1	Management for Safety,	1
5.2	Road Safety Audits Management Systems,	1
5.3	Road Safety Tools for Safety Management Systems,	1
5.4	Road Safety Audit Process,	1
5.5	Approach to Safety	1
5.6	Road Safety Improvement Strategies	2
5.7	ITS and Safety	2

Course Designers

Dr.D.Sivakumar - sivakumard@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Machine Operations –Vehicle Traffic, Highway Capacity.
3. Solution of system of linear equationsfor Effectiveness of Safety Design Features.
4. Computation of Road Safety in Urban Transport
5. Finding ordinary and partial Safety Tools for Safety Management Systems.

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60 CE L05	Environment and Ecology	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- Understand the scope and multidisciplinary nature of environmental studies.
- Evaluate the role of biodiversity in shaping ecosystems.
- Identify endangered and endemic species and understand their conservation importance.
- Understand the role of biomonitoring in assessing aquatic ecosystem health.
- Evaluate integrated ecological engineering systems through case studies.

Prerequisite

Basic knowledge of properties of construction materials.

CourseOutcomes

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

CO1	Demonstrate an understanding of the multidisciplinary nature of environmental studies.	Knowledge/ Analyse/ Apply
CO2	Describe the structure and function of various ecosystems.	Knowledge/ Analyse/ Apply
CO3	Identify and analyze endangered and endemic species, understanding their conservation significance.	Knowledge/ Analyse/ Apply
CO4	Apply ecological principles to propose rehabilitation strategies for damaged ecosystems.	Knowledge/ Analyse/ Apply
CO5	Recognize the role of engineers in promoting public awareness, education, and participation for ecosystem protection.	Knowledge/ Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	2	2	3
CO2	3	2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	2	2	3	2	3	2	2	2	2	3
CO4	3	2	2	3	3	2	3	3	3	3	3	3
CO5	3	2	2	3	3	2	3	3	3	3	3	3

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	20	20	30
Apply (Ap)	30	20	50
Analyse (An)	10	20	20
Create (Cr)		-	-

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K.S.RangasamyCollege ofTechnology–Autonomous R2022								
Environment and Ecology								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

ENVIRONMENTAL STUDIES, ECOSYSTEM AND BIODIVERSITY* Environment - Segment - Environmental studies - Scope and multidisciplinary nature - Need for public awareness - Environmental ethics- Ecosystem - Structure and function - Ecological succession. Biodiversity - Values of biodiversity - Endangered and endemic species - Hot spots - India a mega biodiversity nation - Threats - Impact of biodiversity loss - Conservation - In-situ and ex-situ - Case studies	**[09]**
ECOSYSTEM FUNCTIONS ** Energy flow and nutrient cycling – Food chain and food webs – Biological magnification, diversity and stability, immature and mature systems. Primary productivity – Biochemical cycling of nitrogen, phosphorous, sulphur an dcarbon dioxide; Habitat ecology - Terrestrial, fresh water, estuarine and marine habitats.	**[09]**
ECOLOGICAL ENGINEERING METHODS ** Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles – step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological systems. .	**[09]**
ECOLOGICAL EFFECTS OF INDUSTRIALISATION ** Ecological effects of exploration, production, extraction, processing, manufacture and transport.	**[09]**
CASE STUDIES AND PUBLIC AWARENESS* Case studies of Integrated ecological engineering systems. Role of engineers – public awareness, education and participation to protect ecosystem.	**[09]**
TotalHours	**45**

Textbook(s):

1.	Odum, E.P., “Fundamental of Ecology”, W.B.Sauders, 2004.
2.	Kormondy, E.J., “Concepts of Ecology”, Prentice Hall, New Delhi, 2012.

Reference(s):

1.	Mitch, J.W. and Jorgensen, S.E., “Ecological Engineering – An Introduction to Ecotechnology”, John Wiley and Sons, 2001.
2.	Colinvaux, P., “Ecology”, John Wiley and Sons, 2001.
3.	Etnier, C & Guterstam, B., “Ecological Engineering for Wastewater Treatment”, 2nd Edition, Lewis Publications, London, 2000.
4.	Deeksha Dave and Katewa. S.S, “Environmental Studies” 2nd Edition, Cengage Publications, Delhi, 2013.

***SDG:4 Quality Education, **SDG:9: Industry, innovation and infrastructure**

CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**ENVIRONMENTAL STUDIES, ECOSYSTEM AND BIODIVERSITY**	
1.1	Definition of the environment and its segments.	1
1.2	Overview of environmental studies and its scope.	1
1.3	Multidisciplinary Nature and Public Awareness	1
1.4	Discussion on the multidisciplinary nature of environmental studies.	1

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1.5	Importance of public awareness in environmental issues.	1
1.6	Environmental Ethics and Ecosystem Basics	2
1.7	Introduction to environmental ethics.	2
2	**ECOSYSTEM FUNCTIONS**	
2.1	Introduction to Biodiversity	1
2.2	Values of biodiversity.	1
2.3	Identification of endangered and endemic species.	1
2.4	Overview of biodiversity hotspots and India as a mega biodiversity nation.	2
2.5	Threats, Impact, and Conservation	2
2.6	Analysis of threats to biodiversity and the impact of biodiversity loss.	2
3	**ECOLOGICAL ENGINEERING METHODS**	
3.1	Discussion on conservation methods (in-situ and ex-situ).	1
3.2	Introduction to case studies.	1
3.3	Ecosystem Functions	1
3.4	Energy Flow and Nutrient Cycling	1
3.5	Explanation of energy flow and nutrient cycling.	1
3.6	Analysis of food chains and food webs.	2
3.7	Diversity, Stability, and Productivity	1
3.8	Discussion on biodiversity and ecosystem stability.	1
4	**ECOLOGICAL EFFECTS OF INDUSTRIALISATION**	
4.1	Differentiation between immature and mature ecosystems.	1
4.2	Overview of primary productivity and biochemical cycling.	1
4.3	Habitat Ecology	1
4.4	Exploration of habitat ecology in different environments.	1
4.5	Ecological Engineering Methods	1
4.6	Understanding the role of biomonitoring in aquatic ecosystems.	2
4.7	Principles of ecosystem rehabilitation.	1
4.8	Detailed study of methods such as step cropping, bio-wind screens, wetlands, ponds, and Root Zone Treatment for wastewater.	1
5	**CASE STUDIES AND PUBLIC AWARENESS**	
5.1	Analysis of the reuse of treated wastewater through ecological systems.	2
5.2	Industrialisation and Ecological Effects	2
5.3	Examination of the ecological effects of exploration, production, extraction, processing, manufacture, and transport.	1
5.4	In-depth analysis of case studies on integrated ecological engineering systems.	2
5.5	Recognizing the role of engineers in promoting public awareness, education, and participation for ecosystem protection.	1
	Total	**45**

CourseDesigners

1. Dr.N.RAMESH - rameshn@ksrct.ac.in

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60CEL06	ARCHITECTURAL ENGINEERING	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand about principles and elements of architecture
- To know about various building types
- To learn the principles of orientation and planning of buildings
- To impart knowledge on Techniques in planning
- To get exposure in Development control rules

Prerequisite

-

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Understand the elements and principles of architecture	Remember/ Understand Analyse/ Apply
CO2	Classify the residential, industrial and public building.	Remember/ Understand Analyse/ Apply
CO3	Know the principles of orientation & planning of buildings	Remember/ Understand Analyse/ Apply
CO4	Apply various techniques in planning	Remember/ Understand Analyse/ Apply
CO5	Plan the site based on Zoning regulations	Remember/ Understand Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	3	2	2	2	2	2	2	2
CO2	3	2	3	2	2	2	2	2	2	2	2	2
CO3	3	2	3	3	3	2	2	2	2	2	2	2
CO4	3	2	3	2	2	2	2	2	2	2	2	2
CO5	3	2	3	2	2	2	2	2	2	2	2	2

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember (Re)	10	10	10
Understand (Un)	10	10	20
Apply (Ap)	30	20	50
Analyse (An)	10	20	20

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K.S.RangasamyCollege ofTechnology –Autonomous R2022								
Architectural Engineering								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Introduction to Architecture** Definition and elements of architecture, principles of composition, qualities and factors in architectural design - Analysis integration of function and aesthetics. Factors influencing the character and style of building	**[09]**
Building Types** Building types – Classification of residential, industries and public building - Planning concepts - Residential, institutional, commercial and Industrial - Application of anthropometry and space standards - Building rules and regulations - Layout regulations	**[10]**
Principles of Orientation and Planning of Buildings* Factors affecting orientation – sun – wind – rain-orientation criteria for Indian conditions-Principles governing the theory of planning –planning of residential buildings	**[07]**
Techniques in Planning** Planning survey techniques - preparation of urban and regional structure plans, development plans, action plans - site planning - principles and design - statistical methods of data analysis - application of G.I.S and remote sensing techniques in urban and regional planning - decision making models	**[10]**
Development Control Rules** Zoning regulations –sub division regulations-building regulations-floor space index-minimum plot sizes and building frontage-open spaces-minimum standard dimensions of building elements-organization and administration of planning agencies at National, State,Regional, Local and Metropolitan levels.	**[09]**
TotalHours	**45**

Textbook(s):	
1.	VRA. Saathappan and K. Yogeshwari, Principles of Architecture, Raamalingaa Publication, 2006
2.	Rangwala S C, Town Planning,Charotar Publishing House, 2021
Reference(s):	
1.	G.Muthu Shoba Mohan ,Principles of Architecture, Oxford University Press,2006
2.	Francis DK Ching ,Architecture, Form, space & order ,John Wiley & Sons Publication, Inc
3.	M. Pratap Rao, Urban Planning, CBS Publishers and Distributors, New Delhi, 2019
4.	Time Saver Standards for Housing & Residential Development , Tata McGraw Hill published by Education Private Limited

***SDG7 – Affordable and Clean Energy**
****SDG9 – Industry Innovation and Infrastructure**

CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**Introduction to Architecture**	
1.1	Introduction to the course	1
1.2	Definition and elements of architecture	1
1.3	Principles of composition	1
1.4	Qualities and factors in architectural design	2
1.5	Analysis integration of function and aesthetics	2

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1.6	Factors influencing the character and style of building	2
2	**Building Types**	
2.1	Classification of residential, industries and public building	2
2.2	Planning concepts – Residential and institutional	2
2.3	Planning concepts - Commercial and Industrial	2
2.4	Application of anthropometry and space standards	1
2.5	Building rules and regulations	2
2.6	Layout regulations	1
3	**Principles of Orientation and Planning of Buildings**	
3.1	General Principles in building orientation	1
3.2	Factors affecting orientation	1
3.3	Sun-wind-rain-orientation criteria for Indian conditions	2
3.4	Principles governing the theory of planning	1
3.5	Planning of residential buildings.	2
4	**Techniques in Planning**	
4.1	Planning survey techniques	2
4.2	Preparation of urban and regional structure plans	2
4.3	Development plans &action plans	1
4.4	Site planning - Principles and design	1
4.5	Statistical methods of data analysis	1
4.6	Application of G.I.S in urban and regional planning	1
4.7	Application of remote sensing techniques in urban and regional planning	1
4.8	Decision making models	1
5	**Development Control Rules**	
5.1	Zoning regulations -Sub division regulations	1
5.2	Building regulations	2
5.3	Floor space index- floor space index- minimum plot sizes and building frontage	1
5.4	Open spaces-minimum standard dimensions of building elements	1
5.5	Organization and administration of planning agencies at National, State andRegional	2
5.6	Organization and administration of planning agencies at Local and Metropolitan levels	2
	Total	**45**

CourseDesigners

1. Mr.K.ANGU SENTHIL - angusenthil@ksrct.ac.in

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60 CEL07	Forensic Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To provide an exposure to the Forensic Technology solving crimes
- To impart knowledge in the selection of handling types of crime scenes by police
- To determine the Signature Verification and other forensic related techniques.
- To Determine of Age of Document.
- To evaluate the problems for Legal processes

Prerequisite

Courses –

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	State the adequate knowledge on forensic science.	Remember/ Understand/ Analyse/Apply
CO2	Apply the concepts of finger prints with evidence.	Remember/ Understand/ Analyse/Apply
CO3	Classify the report preparation.	Remember/ Understand/ Analyse/Apply
CO4	Evaluate the concepts in scene patterns.	Remember/ Understand/ Analyse/Apply
CO5	Review the knowledge of recement technologies in legal process.	Remember/ Understand/ Analyse/Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	3	2	3	3	2	3	3
CO2	3	2	3	2	2	3	3	3	3	2	3	3
CO3	3	1	3	2	2	3	3	3	3	2	2	3
CO4	3	3	3	3	2	3	3	3	3	2	3	3
CO5	3	3	3	1	2	3	3	3	3	2	3	3
3- Strong;2-Medium;1-Some												

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember(Re)	05	05	15
Understand(Un)	05	05	15
Apply (Ap)	35	30	50
Analyse (An)	15	20	20
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous								R2022
60CEL07– Forensic Engineering								
B.E.Civil Engineering								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	60	3	40	60	100

Basic Forensic Science*

Definition of Forensic Science, The Role of the Forensic Laboratory, History and Development of Forensic Science in India & Abroad, Pioneers in Forensic Science, Multidisciplinary nature, Forensic Technology solving crimes with advanced technology, Forensic intelligence and Interviews. Forensic Evidences: Concise of Forensic Physical, Biological, Chemical and Psychological evidences, Medico-Legal Cases. Laws and Principles of Forensic Science: Law of Exchange (Locard), Law of Individuality, Law of Comparison, Law of Progressive Changes and Law of Probability, Branches of Forensic Science. **[09]**

Fingerprints in General*

Dactylography, Dermatoglyphics, and Dactyloscopy, basis for the science of fingerprints, Friction Ridge Skin, Morphogenesis of Friction Ridge Skin, Primary Dermal Ridge Development, Definition of fingerprint, History of Fingerprint Identification, Fingerprint as forensic Evidence, Visible Fingermarks, Latent Fingermarks. **[09]**

Report Writing**

Report writing in criminal justice. Report writing in law enforcement. Executive summary writing in police stations. Maintenance of records: statements of witnesses, interviews, media reports. Importance of notes writing at crime scenes. National Crime Record Bureau reports. Crime data depiction: Bar diagrams, pie charts, excel format, line graph **[09]**

Arson Crime Scene**

Hostile conditions at crime sites. Special safety measures at arson sites. Personalprotective equipment requirements at arson scenes. Recognition of type of fire.Location of point of ignition. Fire scene patterns. Information from smoke staining.Searching the fire scene. Collection and preservation of arson evidence.Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Scientific investigation and evaluation of clue materials **[09]**

Recent Trends in Forensic Science**

Environmental Forensics: Definition, Legal processes involving environmental forensic science. Geo-forensics Global Positioning System; Basic principles and applications. Biometrics in Personal Identification: Introduction, Concepts of Biometric Authentication, Role in person Identification, Techniques and Technologies (Finger Print Technology, Face Recognition, IRIS, Retina Geometry, Hand Geometry, Speaker Recognition, Signature Verification and other forensic related techniques). **[09]**

Total Hours: 45 hours

Text book(s):

1	W.G. Eckert and R.K. Wright in *Introduction to Forensic Sciences*, 2nd Edition
2	R.E. Grubb and K.V. Hemby, *Effective Communication in Criminal Justice,SAGE Publications, Inc.* London (2018).

Reference(s):

1	Lee and Gaensleen's, *Advances in Fingerprint Technology*, 3rd Edition, R.S.Ramotowski (Ed.), CRC Press, Boca Raton (2013).
2	Lee and Gaensleen's, *Advances in Fingerprint Technology*, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013)..

***SDG:4 – Quality Education**

****SDG:9 – Industry, Innovation and Infrastructure**

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Basic Forensic Science**	
1.1	Definition of Forensic Science, The Role of the Forensic Laboratory,	1

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1.2	History and Development of Forensic Science in India & Abroad, Pioneers in Forensic Science,	1
1.3	Multidisciplinary nature, Forensic Technology solving crimes with advanced technology, Forensic intelligence and Interviews.	1
1.4	Forensic Evidences: Concise of Forensic Physical, Biological, Chemical and Psychological evidences,	1
1.5	Medico-Legal Cases. Laws and Principles of Forensic Science:	1
1.6	Law of Exchange (Locard), Law of Individuality,	1
1.7	Law of Comparison,	1
1.8	Law of Progressive Changes	1
1.9	Law of Probability, Branches of Forensic Science	1
2	**Fingerprints in General**	
2.1	Dactylography, Dermatoglyphics,	1
2.2	Dactyloscopy, basis for the science of fingerprints,	1
2.3	Friction Ridge Skin, Morphogenesis of Friction Ridge Skin,	1
2.4	Primary Dermal Ridge Development, Definition of fingerprint,	1
2.5	History of Fingerprint Identification,	2
2.6	Fingerprint as forensic Evidence,	1
2.7	Visible Fingermarks	1
2.8	Latent Fingermarks	1
3	**Report Writing**	
3.1	Report writing in criminal justice.	1
3.2	Report writing in law enforcement.	1
3.3	Executive summary writing in police stations.	1
3.4	Maintenance of records: statements of witnesses, interviews, media reports.	1
3.5	Importance of notes writing at crime scenes.	1
3.6	National Crime Record Bureau reports.	2
3.7	Crime data depiction: Bar diagrams, pie charts, excel format, line graph	2
4	**Arson Crime Scene**	
4.1	Hostile conditions at crime sites. Special safety measures at arson sites.	1
4.2	Personalprotective equipment requirements at arson scenes.	1
4.3	Recognition of type of fire.Location of point of ignition.	1
4.4	Fire scene patterns. Information from smoke staining.	1
4.5	Searching the fire scene. Collection and preservation of arson evidence.	1
4.6	Analysis of fire debris.	1
4.7	Analysis of ignitable liquid residue.	1
4.8	Post-flashover burning.	1
4.9	Scientific investigation and evaluation of clue materials	1
5	**Recent Trends in Forensic Science**	
5.1	Introduction-Environmental Forensics: Definition, Legal processes involving environmental forensic science. Geo-forensics Global Positioning System; Basic principles and applications.	1
5.2	Biometrics in Personal Identification	1
5.3	Introduction, Concepts of Biometric Authentication,	1

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5.4	Role in person Identification,	1
5.5	Techniques and Technologies likeFinger Print Technology	1
5.6	Techniques and Technologies like Face Recognition, IRIS, Retina Geometry, Hand Geometry,	2
5.7	Techniques and Technologies like Speaker Recognition, Signature Verification and other forensic related techniques	2

Course Designers

Dr.D.Sivakumar - sivakumard@ksrct.ac.in

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Machine Operations –Fingerprint Identification.
3. Solution of system of linear equationsSpecial safety measures at arson sites.
4. Computation of Personalprotective equipment requirements at arson scenes
5. Finding ordinary and partial Biometrics in Personal Identification.

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60CEL08	Sustainable Infrastructure	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To explain the importance of sustainable built environment
- To emphasis the significance of sustainable development and construction
- To introduce the techniques and for assessing environmental impact.
- To perform the service life and life cycle assessments
- To develop strategies to improve infrastructure resilience and reduce vulnerability to various risks.

Prerequisite

Fundamentals of Mathematics, knowledge of analysis of structures and Fundamendals of reinforced concrete Design

CourseOutcomes

Onthesuccessful completion ofthecourse, students will beable to

CO1	Understand the Concept of Infrastructure and Its Types	Create
CO2	Examine Regulatory Frameworks and Standards	Apply
CO3	Explore Environmental Assessment Tools and Methodologies	Understand
CO4	Understand the Impact of Climate Change on Infrastructure.	Apply
CO5	Conduct Resilience and Vulnerability Assessments	Understand

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2			2	1	1	2			
CO2	3				1		1	3		2		
CO3	2				2		3	1			1	
CO4	3	1	1	2		1	3	2		1		2
CO5	3	2	1				1	2	2			

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End Sem. Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	10	10	20
Analyse	10	10	20
Evaluate	10	10	10
Create	10	10	30

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K.S.RangasamyCollege ofTechnology–Autonomous R2022								
60CEL08- Sustainable Infrastructure								
CSBS								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
	3	0	0	60	3	40	60	100

Introduction to Infrastructure and Sustainable Development* Definition and types of infrastructure - Overview of buildings, structures, communication networks, transport systems, water and wastewater treatment, and energy production - The role of infrastructure in sustainable development - International perspectives on infrastructure development	**[09]**
Regulations, Standards, and Sustainability** Regulatory frameworks for sustainable infrastructure - International standards for construction and management - Compliance and certification processes - Case studies on successful implementation of regulations	**[09]**
Indicators of Sustainability and Environmental Assessment** Key indicators for evaluating the sustainability of infrastructure - Life cycle assessments (LCA) for infrastructure projects - Material flow analysis (MFA) in infrastructure - Environmental assessment tools and methodologies	**[09]**
Climate Change and Infrastructure** Impact of climate change on infrastructure - Mitigation and adaptation strategies - Resilience and vulnerability assessments - Case studies on climate-resilient infrastructure projects	**[09]**
Safety and Vulnerability of Infrastructure** Risk assessment and management for infrastructure - Vulnerability analysis and strategies for improvement - Emergency response planning - Case studies on safety and vulnerability in different types of infrastructure	**[09]**
TotalHours	**60**

Textbook(s):	
1.	Sarte S. B.,'Sustainable Infrastructure: The Guide to Green Engineering and Design, Wiley; 1st edition, 2010.
2.	Horne R. E., Grant T., Verghese K., 'Life Cycle Assessment: Principles, Practice and Prospects', CSIRO, 2009..
Reference(s):	
1.	Karli Verghese, Helen Lewis, Leanne Fitzpatrick, 'Packaging for Sustainability', Springer, 2012.
2.	FIB bulletin 88, 'Sustainability of precast structures', 2018.
3.	S. Bry Sarte, 'Sustainable Infrastructure: Principles into Practice', 2016.
4.	Abhas K. Jha, Robin Bloch, and Jessica Lamond, "Climate Resilient Infrastructure: Adaptive Design and Risk Management", The World Bank, 2015.

***SDG:4 Quality Education**
****SDG:9: Industry, innovation and infrastructure**

CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**Introduction to Infrastructure and Sustainable Development**	
1.1	Present the definition of infrastructure and its significance	1
1.2	Discuss the broad categories of infrastructure (e.g., social, economic, environmental).	1

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1.3	Group activity: Identify and categorize local examples of infrastructure.	1
1.4	Provide an overview of various types of infrastructure.	2
1.5	An the interdependence of different infrastructure components.	2
1.6	The significance of communication networks and transportation systems.	2
2	**Regulations, Standards, and Sustainability**	
2.1	Regulatory Frameworks for Sustainable Infrastructure	1
2.2	Importance of regulations and standards in sustainable infrastructure.	1
2.3	Regulatory frameworks for sustainable infrastructure	2
2.4	The purpose, development, and evolution of regulations.	1
2.5	Case studies demonstrating the impact of regulatory frameworks on infrastructure projects	1
2.6	International standards for construction and management.	1
2.7	Compliance processes and certification requirements	1
2.8	The role of certification in ensuring adherence to standards.	1
2.9	Group exercise: Analyze a hypothetical project and identify the international standards applicable.	1
2.10	Various case studies showcasing successful implementation of regulations in sustainable infrastructure projects.	1
3	**Indicators of Sustainability and Environmental Assessment**	
3.1	Overview of Sustainable Development Goals (SDGs)	2
3.2	Life cycle stages: cradle-to-grave analysis	2
3.3	Application of MFA in infrastructure planning and management	1
3.4	Introduction to various environmental assessment tools (e.g., LEED, BREEAM)	1
3.5	Green infrastructure and its benefits	1
3.6	Overview of global and local sustainability policies	1
3.7	Cost-benefit analysis for sustainable infrastructure	1
4	**Climate Change and Infrastructure**	
4.1	Overview of climate change and its impact on infrastructure	2
4.2	Understanding Vulnerability and Resilience	1
4.3	Climate Modeling and Impact Assessment	1
4.4	Reducing greenhouse gas emissions in infrastructure projects	1
4.5	Sustainable and low-carbon construction practices	1
4.6	Nature-based solutions for adaptation in infrastructure	1

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4.8	Case studies of successful climate-resilient water projects	1
4.9	Student presentations on researched case studies	1
5	**Safety and Vulnerability of Infrastructure**	
5.1	Importance of risk assessment in project planning and management	2
5.2	Risk Identification and Classification	1
5.3	Risk Analysis and Quantification	1
5.4	Vulnerability Analysis and Improvement Strategies	1
5.5	Emergency Response Planning for Infrastructure	1
5.6	Crisis Communication and Stakeholder Engagement	1
5.7	In-depth analysis of selected case studies in various infrastructure sectors	1

CourseDesigners

1. Dr.K.VIJAYA SUNDRAVEL - vijayasundravel@ksrct.ac.in

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60CEL09	Fundamentals of Civil Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand about principles and elements of various building
- To know about various building materials
- To learn the principles of building construction
- To impart knowledge on basic infrastructure services.
- To get exposure in urban engineering

Prerequisite

-

CourseOutcomes

Onthesuccessful completion ofthecourse,studentswill beable to

CO1	Understand the elements and principles of various building	Remember/ Understand Analyse/ Apply
CO2	Classify the building materials and functional requirements	Remember/ Understand Analyse/ Apply
CO3	Know the principles of building construction	Remember/ Understand Analyse/ Apply
CO4	Apply various techniques in planning aspects of infrastructure services	Remember/ Understand Analyse/ Apply
CO5	Plan the site based on urban engineering	Remember/ Understand Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	3	2	2	2	2	2	2	2
CO2	3	2	3	2	2	2	2	2	2	2	2	2
CO3	3	2	3	3	3	2	2	2	2	2	2	2
CO4	3	2	3	2	2	2	2	2	2	2	2	2
CO5	3	2	3	2	2	2	2	2	2	2	2	2

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Remember (Re)	10	10	10
Understand (Un)	10	10	20
Apply (Ap)	30	20	50
Analyse (An)	10	20	20

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60 CE L09-Fundamentals of Civil Engineering								
Civil Engineering								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Introduction to civil engineering** Introduction to Civil Engineering – Various disciplines of Civil engineering, Importance of Civil engineering in infrastructure development of the country. Introduction to types of buildings as per NBC, Selection of site for buildings, Components of a residential building and their functions, Introduction to Industrial buildings and types. Building Planning – Basic requirements, elements, introduction to various building area terms, computation of plinth area, carpet area.	**[09]**
Surveying and Building Materials ** Surveying – Principle and objectives, Instruments used, Horizontal measurements, Ranging (direct ranging only), Instruments used for ranging, Leveling – Definition, Principles, Instruments, Preparation of level book, problems on leveling, Modern surveying instruments. Building Materials – Bricks, properties and specifications, Cement – Types, properties, grades, other types of cement and uses, Cement mortar – Constituents, Preparation, Concrete PCC and RCC, Grades, Steel – Use of steel in buildings, types.	**[10]**
Principles of Building Construction* Building Construction – Foundations, Classification, Bearing Capacity of Soil and related terms (definition only), Masonry Works – classifications, definition of different technical terms, Brick masonry – types, bonds, general principle, Roofs – functional requirements, basic technical terms, roof covering material, Floors – function, types, flooring materials (brief discussion), Plastering and Painting – objectives, types, preparation and procedure of application.	**[07]**
Techniques in infrastructure services** Basic Infrastructure services – air conditioning & purpose, fire protection & materials, Ventilation, necessity & functional requirements, Lifts, Escalators. Introduction to planning and design aspects of transportation engineering, Transportation modes, Highway engineering – historical development, highway planning, classification of highway, Railway Engineering – cross section of rail track, basic terminology, geometric design parameter (brief discussion only).	**[10]**
Airport and urban engineering** Airport engineering – development, types, definition, characteristics of aircraft, basic terminology, Traffic engineering – traffic characteristics, traffic studies, traffic operations (signals, signs, markings), Urban engineering – classification of urban road. Irrigation & Water Supply Engineering – Introduction, Types of Irrigation, different types of hydraulic structures, dam and weirs, types of dam, purpose and functions.	**[09]**
TotalHours	**45**

Textbook(s):	
1.	Basic Civil engineering, Gopi, S., Pearson Publication-2020
2.	Basic Civil Engineering, Bhavikatti, S. S., New Age-2021
Reference(s):	
1.	Construction Technology, Chudley, R., Longman Group, England-2014
2.	Basic Civil and Environmental Engineering, C.P. Kausik, New Age.-2021
3.	American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application-2020

***SDG7 – Affordable and Clean Energy**
****SDG9 – Industry Innovation and Infrastructure**

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Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Introduction to civil engineering**	
1.1	Various disciplines of Civil engineering	1
1.2	Introduction to types of buildings as per NBC	2
1.3	Selection of site for buildings	2
1.4	Introduction to Industrial buildings	2
1.5	Classification of Building Planning	2
1.6	Introduction to various building area	2
2	**Surveying and Building Materials**	
2.1	Principle and objectives Surveying	2
2.2	Preparation of level book	2
2.3	Types of cement and uses	2
2.4	Application of building materials	1
2.5	Types of cement and uses	2
2.6	Use of steel in buildings	2
3	**Principles of Building Construction**	
3.1	General Principles in building construction	1
3.2	Factors affecting Bearing capacity of soil	2
3.3	Different technical terms of brick masonry	2
3.4	Principles governing the theory of flooring materials	2
3.5	Planning of Plastering and Painting.	2
4	**Techniques in infrastructure services**	
4.1	Basic Infrastructure services	2
4.2	Functional requirements of lifts and escalators	1
4.3	Planning and design aspects of transportation engineering	2
4.4	Classification of highway	2
5	**Airport and urban engineering**	
5.1	Characteristics of aircraft	1
5.2	Traffic characteristics and operations	2
5.3	Classification of urban road	2
5.4	Different types of hydraulic structures	2
	Total	**45**

CourseDesigners

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60CEL10	Urban and Regional Planning	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To impart the fundamental knowledge about urban and region as per census
- To acquire knowledge in urban problems and their solutions
- To learn the fundamental knowledge of planning process
- To acquire knowledge in regional planning and their solutions
- To know various planning techniques

Prerequisite

Basic knowledge of engineering and management

CourseOutcomes

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

CO1	Describe the rural and urban settlement in current scenario.	Knowledge/ Analyse/ Apply
CO2	Explain the urban problems and their solutions	Knowledge/ Analyse/ Apply
CO3	Outline the planning process in urban and regional area	Knowledge/ Analyse/ Apply
CO4	Summarize the regional problems and their solutions	Knowledge/ Analyse/ Apply
CO5	Study on data collection in urban and regional, its importance	Knowledge/ Analyse/ Apply

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	1	3	2	1	1		2
CO2	3	1	1	2	2	2	3	2	1	1		2
CO3	3	1	1	2	2	2	3	2	1	1		2
CO4	3	2	1	2	2	1	3	2	1	1		2
CO5	3	2	1	2	3	1	3	2	1	1		2

3- Strong;2-Medium;1-Some

AssessmentPattern

Bloom'sCategory	ContinuousAssessmentTests (Marks)		End SemExamination (Marks)
	1	2	
Knowledge (Kn)	30	30	50
Apply (Ap)	20	20	30
Analyse (An)	10	10	20
Create (Cr)		-	-

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K.S.Rangasamy College of Technology–Autonomous R2022								
60 CE L10-Urban and Regional Planning								
Civil Engineering								
Semester	Hours/Week			Total hrs	Credit	MaximumMarks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Introduction * ** Definition and characteristics, rural, urban settlements as per census and classification of towns, city, metropolis, megalopolis, interaction and interdependence between city-region	[09]
Urbanization process * ** Definition, character, function, migration, role of social, economic and demographic aspects on urbanization, major components of a settlement, major urban problems and their solutions, land uses.	[09]
Planning process * ** Definition, need and importance, function and type of planning (sectoral and spatial), administrative level of planning (local, block, state and national), role of environment, society, economy, political, administrative and legal system on planning process.	[09]
Regional planning * ** Definition, need and importance, objective, concept of region, types of regions - resource region, agro–climatic region, topographic region, contents of regional planning for block, district, state, national, NCR, major regional problems and their solutions.	[09]
Planning Techniques * ** Methods of Data Collection - Classification and Tabulation of Data – Measures of Central Tendencies and Dispersion – Questionnaire Design – Types of Sampling – Sampling Size – Sampling and Non-sampling Error.	[09]
TotalHours	45

Textbook(s):	
1.	Viviana Kaminski, ‘Urban Studies and Planning. World Technologies’, NewDelhi, 2012.
2.	S.K. Kulshrestha, ‘Dictionary of Urban and Regional Planning’, Kalpaz Publications, Delhi.2006
Reference(s):	
1.	Randall Crane and Rachel Weber, ‘The Oxford Handbook of Urban Planning’, Oxford University Press, NewYork, 2012.
2.	Arthur O’ Sullivan, ‘Urban Economics’, McGraw – Hill/Irwin, New York, 8 th edition, 2012.
3.	Kruekeberg, D. A., and Silvers, A.L, ‘Urban Planning Analysis: Methods and Models’. Wiley, New York, 2002
4.	K.R. Thooyavan, ‘Human Settlements – A Planning Guide to Beginners, M.A. Publications, Chennai, 2005

***SDG- 4: Quality Education ** SDG - 11: Sustainable Cities and Communities**

CourseContentsandLectureSchedule

S.No	Topic	No.of Hours
1	**Introduction**	
1.1	Definition and characteristics of rural settlements as per census	2
1.2	Definition and characteristics of urban settlements as per census	2
1.3	Classification of towns	1
1.4	Classification of city	1
1.5	Classification of metropolis	1

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1.6	Classification of megalopolis	1
1.7	Interaction and interdependence between city-region	1
2	**Urbanization process**	
2.1	Definition and characteristics of urbanization	2
2.2	Migration of urbanization	1
2.3	role of social urbanization	1
2.4	economic and demographic aspects on urbanization	2
2.5	major components of a settlement	1
2.6	major urban problems and their solutions	1
2.7	land uses	1
3	**Planning process**	
3.1	Definition, need and importance of Planning	1
3.2	function and type of planning	2
3.3	administrative level of planning	1
3.4	role of environment on planning process.	1
3.5	Society on planning process.	1
3.6	Economy on planning process.	1
3.7	Political and administrative on planning process.	1
3.8	legal system on planning process	1
4	**Regional planning**	
4.1	Definition, need and importance of regional Planning	1
4.2	Resource of regional Planning	1
4.3	Function and type of regional planning	2
4.4	agro–climatic region	1
4.5	topographic region	1
4.6	contents of regional planning for block, district, state, national	2
4.7	major regional problems and their solutions.	1
5	**Planning Techniques**	
5.1	Methods of Data Collection	1
5.2	Classification and Tabulation of Data	2
5.3	Measures of Central Tendencies and Dispersion	1
5.4	Questionnaire Design	1
5.5	Types of Sampling	1
5.6	Sampling Size	2
5.7	Sampling and Non-sampling Error.	1
	Total	**45**

CourseDesigners

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