



KSR College of
Engineering

AN AUTONOMOUS INSTITUTION

25
Years
KSRCE
2001 - 2026
Celebrating
Academic Excellence

NAAC
ACCREDITED **A++**

NBA
ACCREDITED
PROGRAMMES



M.E - CONSTRUCTION ENGINEERING AND MANAGEMENT

REGULATIONS 2024

(Academic Year 2024-25 Onwards)

Curriculum & Syllabus



**K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215****(Autonomous)****DEPARTMENT OF CIVIL ENGINEERING****M.E - CONSTRUCTION ENGINEERING AND MANAGEMENT****(REGULATIONS 2024)****Vision of the Institution**

IV	To become a globally renowned institution in Engineering and Management, committed to providing holistic education that fosters research, innovation and sustainable development.
-----------	---

Mission of the Institution

IM 1	Deliver value-based quality education through modern pedagogy and experiential learning.
IM 2	Enrich Engineering and Managerial Skills through cutting-edge laboratories to meet evolving global demands.
IM 3	Empower research and innovation by integrating collaboration, social responsibility, and commitment to sustainable development.

Vision of the Department

DV	To develop premier Civil Engineers through education, fostering innovation and research to create a sustainable environment.
-----------	--

Mission of the Department

DM 1	Provide value-based education using advanced teaching methods and experiential learning.
DM 2	Prepare engineers for global challenges through state-of-the-art labs and advanced skills.
DM 3	Promote research, foster innovation, and strengthen industry collaboration, addressing infrastructure challenges through sustainable solutions.



Chairman (BoS)



Programme Educational Objectives (PEOs): M.E. – Construction Engineering and Management

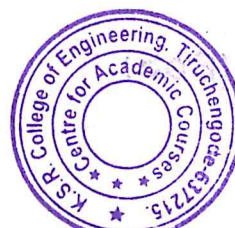
The graduates of the programme will be able to	
PEO 1	Professional Skill Development To impart the concepts and technical education needed for a career in Construction Engineering and management.
PEO 2	Core Competence: To provide students with the knowledge and dexterity to perform effectively in the workplace with the communication skills needed to deal with fellow workers, clients and public.
PEO 3	Interpersonal Skill and teamwork: To promote a strong sense of ethics, professionalism, a respect for diversity and a knowledge of contemporary professional, social and global issues.

Programme Outcomes (POs) of M.E. - Construction Engineering and Management

Program Outcomes (POs)	
PO1	Conduct Investigations of complex Problems: An ability to independently carry out research / investigation and development work to solve practical problems.
PO2	Presentation Skill: An ability to write and present a substantial technical report / document
PO3	Scholarship of Knowledge: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
PO4	Research Culture: Profound knowledge of Construction Engineering and Management discipline, with an ability to evaluate, analyze, and synthesize existing and emerging knowledge in the field of project planning, scheduling, cost optimization, and resource management, with wide applications in sustainable construction practices and infrastructure development.
PO5	Core Values: Critically analyze complex Construction Engineering and Management problems, apply independent judgment to synthesize information, and make innovative advances in project planning, execution, and policy context.



Chairman (BoS)

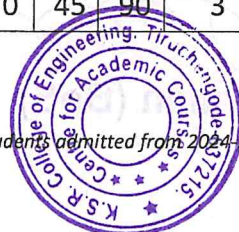


				K. S. R COLLEGE OF ENGINEERING (Autonomous) Approved by AICTE and Affiliated to Anna University, Chennai Accredited by NAAC ('A++' Grade) K.S.R. Kalvi Nagar, Tiruchengode - 637 215							CURRICULUM PG R 2024		
Department				Civil Engineering									
Programme				M.E. – Construction Engineering and Management									
SEMESTER – I													
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit C= T/30	Maximum Marks			
				L	T	P	SL	Tot		CA	ES	Total	
THEORY COURSES													
1	CN24T11	Modern Construction Materials	PCC	45	0	0	45	90	3	40	60	100	
2	CN24T12	Construction Equipment	PCC	45	0	0	45	90	3	40	60	100	
3	CN24T13	Contract Laws and Regulations	PCC	45	0	0	45	90	3	40	60	100	
4	MA24T11	Statistical Methods and Queuing Theory	FC	45	0	0	45	90	3	40	60	100	
5		Professional Elective - I	PEC	45	0	0	45	90	3	40	60	100	
6		Professional Elective - II	PEC	45	0	0	45	90	3	40	60	100	
LABORATORY COURSES													
7	CN24P11	Construction Engineering Laboratory	PCC	0	0	60	0	60	2	60	40	100	
EMPLOYABILITY ENHANCEMENT COURSES													
8	CN24P12	Technical Presentation - I	EEC	0	0	30	0	30	1	60	40	100	
Total				270	0	90	270	630	21	800			

SEMESTER – II												
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot		CA	ES	Total
THEORY COURSES												
1.	RM24T09	Research Methodology and IPR	RMC	45	0	0	45	90	3	40	60	100
2.	CN24T21	Advanced Construction Techniques	PCC	45	0	0	45	90	3	40	60	100
3.	CN24T22	Project Formulation and Appraisal	PCC	45	0	0	45	90	3	40	60	100
4.	CN24T23	Construction Planning, Scheduling and Control	PCC	45	0	0	45	90	3	40	60	100
5.		Professional Elective - III	PEC	45	0	0	45	90	3	40	60	100
6.		Professional Elective - IV	PEC	45	0	0	45	90	3	40	60	100

Chairman (BoS,
K.S.R College of Engineering

Applicable for the students admitted from 2024-2025 onwards



LABORATORY COURSES												
7.	CN24P21	Advanced Computing Techniques Laboratory	PCC	0	0	60	0	60	2	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES												
8.	CN24P22	Technical Presentation - II	EEC	0	0	30	0	30	1	60	40	100
Total				270	0	90	270	630	21	800		
SEMESTER – III												
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot.		CA	ES	Total
THEORY COURSES												
1.	CN24T31	Construction Project Management	PCC	45	0	0	45	90	3	40	60	100
2.		Professional Elective -V	PEC	45	0	0	45	90	3	40	60	100
3.		Open Elective	OEC	45	0	0	45	90	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSES												
4.	CN24P31	Project Work Phase - I	EEC	0	0	180	0	180	6	60	40	100
5.	CN24P32	Practical Training*	EEC	0	0	30	0	30	1	60	40	100
AUDIT COURSE												
6.	-	Audit Course - I	AC	30	0	0	30	60	0	100	-	100
Total				165	0	210	165	540	16	600		

(* Four weeks during second semester vacation)

SEMESTER – IV												
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot.		CA	ES	Total
EMPLOYABILITY ENHANCEMENT COURSES												
1.	CN24P41	Project Work Phase - II	EEC	0	0	360	0	360	12	60	40	100
Total				0	0	360	0	360	12	100		
TOTAL NO. OF CREDITS = 70												
TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 70												
Note: FC – Foundation Courses, AC – Audit Courses, PCC – Professional Core Courses, PEC – Professional Elective Courses, EEC – Employability Enhancement Courses.												



Chairman (BoS)

K.S.R College of Engineering



Applicable for the students admitted from 2024-2025 onwards

FOUNDATION COURSES (FC)												
Sl. No.	Course Code	Course Name	Category	Hours/Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot.		CA	ES	Total
1.	MA24T11	Statistical Methods and Queuing Theory	FC	45	0	0	45	90	3	40	60	100
Total				45	0	0	45	90	3	-		

PROFESSIONAL CORE COURSES (PCC)												
Sl. No.	Course Code	Course Name	Category	Hours/Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot.		CA	ES	Total
1.	CN24T11	Modern Construction Materials	PCC	45	0	0	45	90	3	40	60	100
2.	CN24T12	Construction Equipment	PCC	45	0	0	45	90	3	40	60	100
3.	CN24T13	Contract Laws and Regulations	PCC	45	0	0	45	90	3	40	60	100
4.	CN24P11	Construction Engineering Laboratory	PCC	0	0	60	0	60	2	60	40	100
5.	CN24T21	Advanced Construction Techniques	PCC	45	0	0	45	90	3	40	60	100
6.	CN24T22	Project Formulation and Appraisal	PCC	45	0	0	45	90	3	40	60	100
7.	CN24T23	Construction Planning, Scheduling and Control	PCC	45	0	0	45	90	3	40	60	100
8.	CN24P21	Advanced Computing Techniques Laboratory	PCC	0	0	60	0	60	2	60	40	100
9.	CN24T31	Construction Project Management	PCC	45	0	0	45	90	3	40	60	100
Total				315	0	120	315	750	25	1800		

RESEARCH METHODOLOGY AND IPR COURSES (RMC)												
S. No.	Course Code	Course Title	Category	Hours/Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot.		CA	ES	Total
1.	RM24T09	Research Methodology and IPR	RMC	45	0	0	45	90	3	40	60	100
Total				45	0	0	45	90	3	-		


Chairman (BoS)



EMPLOYABILITY ENHANCEMENT COURSES (EEC)												
Sl. No.	Course Code	Course Name	Category	Hours/Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot.		CA	ES	Total
1.	CN24P12	Technical Presentation - I	EEC	0	0	30	0	30	1	60	40	100
2.	CN24P22	Technical Presentation - II	EEC	0	0	30	0	30	1	60	40	100
3.	CN24P31	Project Work Phase - I	EEC	0	0	180	0	180	6	60	40	100
4.	CN24P32	Practical Training*	EEC	0	0	30	0	30	1	60	40	100
5.	CN20P41	Project Work Phase - II	EEC	0	0	360	0	360	12	60	40	100

PROFESSIONAL ELECTIVE – I & II (SEMESTER – I)												
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit	Maximum Marks		
				L	T	P	SL	Tot	C= T/30	CA	ES	Total
THEORY COURSES												
1.	CN24E01	Management information system	PEC	45	0	0	45	90	3	40	60	100
2.	CN24E02	Building Services	PEC	45	0	0	45	90	3	40	60	100
3.	CN24E03	Safety Practices and Management	PEC	45	0	0	45	90	3	40	60	100
4.	CN24E04	Business Economics and Finance Management	PEC	45	0	0	45	90	3	40	60	100
5.	CN24E05	Pavement Engineering	PEC	45	0	0	45	90	3	40	60	100
6.	CN24E06	Quantitative Techniques in Management	PEC	45	0	0	45	90	3	40	60	100
7.	CN24E07	Automation in Construction Industry	PEC	45	0	0	45	90	3	40	60	100
8.	CN24E08	Supply Chain Management	PEC	45	0	0	45	90	3	40	60	100
9.	CN24E09	Human Resources Management in Construction	PEC	45	0	0	45	90	3	40	60	100
10.	CN24E10	Risk and Due Diligence	PEC	45	0	0	45	90	3	40	60	100


Chairman (BoS)
 K.S.R College of Engineering


 Applicable for the students admitted from 2024-2025 onwards

PROFESSIONAL ELECTIVE – III and IV (SEMESTER – II)												
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit C= T/30	Maximum Marks		
				L	T	P	SL	Tot		CA	ES	Total
THEORY COURSES												
1.	CN24E11	GIS in Construction Engineering and Management	PEC	45	0	0	45	90	3	40	60	100
2.	CN24E12	Modern Structural Materials and System Design	PEC	45	0	0	45	90	3	40	60	100
3.	CN24E13	Personnel Management in Construction	PEC	45	0	0	45	90	3	40	60	100
4.	CN24E14	Fundamentals of Entrepreneurship	PEC	45	0	0	45	90	3	40	60	100
5.	CN24E15	Energy Conservation Techniques in Building Construction and Maintenance	PEC	45	0	0	45	90	3	40	60	100
6.	CN24E16	Tall Structures	PEC	45	0	0	45	90	3	40	60	100
7.	CN24E17	Infrastructure Development and Bot, Boot Projects	PEC	45	0	0	45	90	3	40	60	100
8.	CN24E18	Urban Planning and Sustainability	PEC	45	0	0	45	90	3	40	60	100
9.	CN24E19	Value Engineering in Construction	PEC	45	0	0	45	90	3	40	60	100
10.	CN24E20	Building Acoustics and Noise control	PEC	45	0	0	45	90	3	40	60	100

PROFESSIONAL ELECTIVE – V (SEMESTER – III)												
Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit	Maximum Marks		
				L	T	P	SL	Tot	C= T/30	CA	ES	Total
THEORY COURSES												
1.	CN24E21	Prefabricated Structures	PEC	45	0	0	45	90	3	40	60	100
2.	CN24E22	Computer Application in Construction Engineering and Planning	PEC	45	0	0	45	90	3	40	60	100
3.	CN24E23	Quality Control and Assurance in Construction	PEC	45	0	0	45	90	3	40	60	100

4.	CN24E24	Resource Management and Control in Construction	PEC	45	0	0	45	90	3	40	60	100
5.	CN24E25	Shoring, Scaffolding and Formwork	PEC	45	0	0	45	90	3	40	60	100

AUDIT COURSES (SEMESTER – III)

Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit	Maximum Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Total
THEORY COURSES												
1.	AX24A01	Disaster Management	AC	30	0	0	30	60	0	100	--	100
2.	AX24A02	Value Education	AC	30	0	0	30	60	0	100	--	100
3.	AX24A03	Constitution of India	AC	30	0	0	30	60	0	100	--	100
4.	AX24A04	Indian Knowledge System	AC	30	0	0	30	60	0	100	--	100

OPEN ELECTIVE COURSES

Sl. No.	Course Code	Course Name	Category	Hours/ Semester					Credit	Maximum Marks		
				L	T	P	SL	Tot	C = T/30	CA	ES	Total
THEORY COURSES												
1.	CN24O31	Energy Efficient Buildings	OEC	45	0	0	45	90	3	40	60	100
2.	CN24O32	Economics and Finance management in construction	OEC	45	0	0	45	90	3	40	60	100
3.	CN24O33	Stress Management	OEC	45	0	0	45	90	3	40	60	100

OPEN ELECTIVES OFFERED BY OTHER PG PROGRAMMES

S.No.	Course Code	Course Title	Category	Periods / Semester					Credit C = T/30	Max. Marks		
				L	T	P	SL	Tot.		CA	ES	Tot.
1.	PE24O01	Switching Concepts and Power Semiconductor Devices	OEC	45	0	0	45	90	3	40	60	100
2.	PE24O02	Smart Grid Technology	OEC	45	0	0	45	90	3	40	60	100
3.	PE24O03	Renewable Energy Technology	OEC	45	0	0	45	90	3	40	60	100

4.	PE24O04	Energy Management and Conservation	OEC	45	0	0	45	90	3	40	60	100
5.	ST24O01	Principles of Sustainable Development	OEC	45	0	0	45	90	3	40	60	100
6.	ST24O02	Failure Analysis of Structures	OEC	45	0	0	45	90	3	40	60	100
7.	ST24O03	Smart materials and Smart Structures	OEC	45	0	0	45	90	3	40	60	100
8.	ET24O01	Embedded Systems	OEC	45	0	0	45	90	3	40	60	100
9.	ET24O02	Embedded Control	OEC	45	0	0	45	90	3	40	60	100
10.	ET24O03	Embedded Automation	OEC	45	0	0	45	90	3	40	60	100
11.	CU24O01	Principles of Multimedia	OEC	45	0	0	45	90	3	40	60	100
12.	CU24O02	IoT for Smart Systems	OEC	45	0	0	45	90	3	40	60	100
13.	CU24O03	MEMS and NEMS	OEC	45	0	0	45	90	3	40	60	100
14.	CU24O04	Introduction to Cognitive Radio Network	OEC	45	0	0	45	90	3	40	60	100

OPEN ELECTIVES OFFERED TO OTHER PG PROGRAMMES

S.No.	Course Code	Course Title	Category	Periods / Semester					Credit C= T/30	Max. Marks		
				L	T	P	SL	Tot.		CA	ES	Tot.
1.	CN 24O01	Energy Efficient Building	OEC	45	0	0	45	90	3	40	60	100
2.	CN 24O02	Economics and Finance Management in Construction	OEC	45	0	0	45	90	3	40	60	100
3.	CN 24O03	Stress management	OEC	45	0	0	45	90	3	40	60	100

COURSE COMPONENT SUMMARY

S. No.	Category	Credits Per Semester				Credits Total	Percentage Credits
		I	II	III	IV		
1.	FC	03	-	-	-	03	4.28
2.	RMC	-	03	-	-	03	4.28
3.	PCC	11	11	03	-	25	35.71
4.	PEC	06	06	03	-	15	21.42
5.	EEC	01	01	07	12	21	30
6.	OEC	-	-	03	-	03	4.28
7.	Audit Course	-	-	0	-	-	0
TOTAL		21	21	16	12	70	100



1	CE24004	Energy Management and Conservation	OEC	45	0	0	0	45	20	3	45	80	120
2	CE24001	Principles of Sustainable Development	OEC	45	0	0	0	45	30	3	40	60	100
3	CE24002	Failure Analysis of Structures	OEC	45	0	0	0	45	40	3	40	60	100
4	CE24003	Smart metering and Smart Structures	OEC	45	0	0	0	45	30	3	40	60	100
5	ET24001	Embedded Systems	OEC	45	0	0	0	45	30	3	40	60	100
6	ET24002	Embedded Control	OEC	45	0	0	0	45	30	3	40	60	100
7	ET24003	Embedded Automation	OEC	45	0	0	0	45	30	3	40	60	100
8	CE24005	Principles of Mathematics	OEC	45	0	0	0	45	30	3	40	60	100
9	CE24006	IoT for Smart Systems	OEC	45	0	0	0	45	30	3	40	60	100
10	CE24007	MEMS and NEMS	OEC	45	0	0	0	45	30	3	40	60	100
11	CE24008	Introduction to Cognitive Radio Network	OEC	45	0	0	0	45	30	3	40	60	100

OFFER ELECTIVES OFFERED TO OTHER PG PROGRAMMES

S.No.	Course Code	Course Title	Category	Periods / Semester					Credit T/30	Max Marks			
				I	II	III	IV	Tot.		CA	ES Tot.		
1	CE24001	Energy Efficient Building	OEC	45	0	0	0	45	30	3	40	60	100
2	CE24002	Construction Management in Economics and Finance	OEC	45	0	0	0	45	30	3	40	60	100
3	CE24003	Smart Infrastructure	OEC	45	0	0	0	45	30	3	40	60	100

COURSE COMPONENT SUMMARY

S.No.	Category	Credits by Semester				Credits Total	Percentage Credits
		I	II	III	IV		
1	FC	03	03	03	03	12	4.28
2	RAM	03	03	03	03	12	4.28
3	PCC	11	11	07	07	36	12.57
4	PSC	08	08	03	03	22	7.57
5	PFC	01	01	07	12	21	7.14
6	OEC	03	03	03	03	12	4.28
7	Other	00	00	00	00	00	0.00
TOTAL		28	28	24	28	108	36.75

CN24T11	MODERN CONSTRUCTION MATERIALS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Understanding of fundamental concepts in civil engineering, including structural analysis and material mechanics and to know the knowledge of properties and behaviors of materials commonly used in construction.							
OBJECTIVES: To provide students with knowledge of the properties, behavior, and applications of modern construction materials including concrete, steels, plastics, composites, and waterproofing compounds, while exploring the features and functionalities of smart and intelligent materials for advanced engineering applications.							
UNIT - I	SPECIAL CONCRETES						(9)
Concretes, Behavior of concretes – Properties and Advantages of High Strength and High-Performance Concrete – Properties and Applications of Fiber Reinforced Concrete, Self-compacting concrete, Alternate Materials to concrete on high performance & high Strength concrete.							
UNIT - II	METALS						(9)
Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminum and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.							
UNIT - III	COMPOSITES						(9)
Types of Plastics – Properties & Manufacturing process – Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP.							
UNIT - IV	OTHER MATERIALS						(9)
Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application.							
UNIT - V	SMART AND INTELLIGENT MATERIALS						(9)
Types & Differences between Smart and Intelligent Materials – Special features – Case studies showing the applications of smart & intelligent Materials.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							


Chairman (BoS)
 K.S.R. College of Engineering

Applicable for the students admitted from 2024-2025 onwards



COURSE OUTCOMES:**At the end of the course, the students will be able to:**

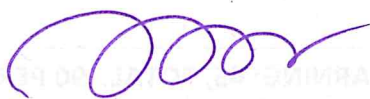
CO1	Apply knowledge of modern materials in production of variety of concrete	Apply
CO2	Apply different type of steel and insulating materials in constructions.	Apply
CO3	Relate data of composites and chemicals in production of modern concrete.	Understand
CO4	Interpret the use of modern construction materials.	Understand
CO5	Illustrate the use of intelligent materials in constructions.	Understand

REFERENCES:

1. Shetty, M.S. and Jain, A.K., Concrete Technology: Theory and Practice, S.Chand & Company Ltd., New Delhi, Eighth Edition, 2018.
2. Rajput, R.K., Engineering Materials, S. Chand & Company Ltd., New Delhi, Third Edition, 2006
3. IS 11384 -1985, Code of Practice for Composite Construction in structural steel and concrete, 1985.
4. <http://nptel.ac.in/downloads/105106053>.

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
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	
Avg.	3	-	3	2	3	

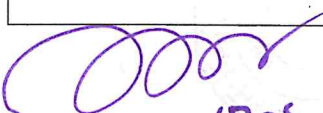
1-low, 2-medium, 3-high

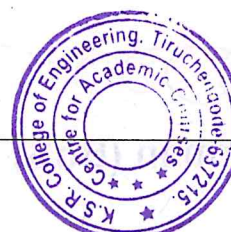


Chairman (BoS)



CN24T12	CONSTRUCTION EQUIPMENT	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Students should have a solid foundation in civil engineering principles and construction management practices. Understanding basic concepts related to earthwork operations, material properties, and construction processes is essential.							
OBJECTIVES: To equip students with knowledge of earthwork operations and specialized construction equipment, along with proficiency in materials handling, aggregate production, and concrete mixing processes, while applying management principles for effective utilization of construction machinery.							
UNIT - I	EQUIPMENT FOR EARTHWORK						(9)
Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers.							
UNIT - II	OTHER CONSTRUCTION EQUIPMENT						(9)
Equipment for Dredging, Trenching, Tunnelling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment –Equipment for Demolition.							
UNIT - III	MATERIALS HANDLING EQUIPMENT						(9)
Forklifts and related equipment - Portable Material Bins – Conveyors - Hauling Equipment.							
UNIT - IV	EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING						(9)
Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment – Transporters.							
UNIT - V	CONSTRUCTION EQUIPMENT MANAGEMENT						(9)
Identification – Resource Planning - Equipment Management in Projects - Maintenance Management – Replacement - Cost Control of Equipment - Depreciation Analysis – Safety Management.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
							


 Chairman (BoS),
 K.S.R. College of Engineering



Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Explain the principles of effective utilization of equipment.	Understand
CO2	Explain the basics of construction equipment.	Understand
CO3	Find the knowledge about the materials handling in construction site.	Remember
CO4	Identify the productivity of equipment management.	Apply
CO5	Analyze the management of equipment and their utilization.	Analyze

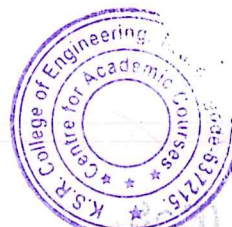
REFERENCES:

1. Peurifoy, R.L. Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, Fifth Edition, 2018.
2. Deodhar, S.V., Construction Equipment and Job Planning, Khanna Publishers, New Delhi, First Edition, 2010.
3. Robert Peurifoy, L. Clifford Schexnayder, J. Aviad Shapira. And Robert Schmitt., Construction Planning, Equipment, and Methods, McGraw-Hill, Arizona State, Ninth Edition, 2010
4. Mahesh Varma., Construction Equipment and its Planning and Application, Metropolitan Book Company, New Delhi, First Edition, 2003

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
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	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high


Chairman (BoS)



CN24T13	CONTRACT LAWS AND REGULATIONS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Basic understanding of legal concepts related to contracts, labor, and property law. Familiarity with construction industry practices, including tendering, bidding, and project management. Awareness of statutory regulations and their impact on civil engineering and construction projects.							
OBJECTIVES: To understand the framework of construction contracts, including the tendering process and documentation, arbitration laws and procedures, legal requirements such as tax and land laws, and labor regulations, while assessing their impact on contract execution and management.							
UNIT - I	CONSTRUCTION CONTRACTS						(9)
Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.							
UNIT - II	TENDERS						(9)
Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines –Transparency in Tamil Nadu Tenders Act – eTender							
UNIT - III	ARBITRATION						(9)
Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs.							
UNIT - IV	LEGAL REQUIREMENTS						(9)
Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations							
UNIT - V	LABOUR REGULATIONS						(9)
Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen’s Compensation Act (1923) – Indian Factory Act(1881) – Tamil Nadu Factory Act(1950) – Child Labour Act(1986) - Other Labour Laws.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Illustrate the elements of concluding, and administering contracts	Understand
CO2	Determine the procedure for tendering and documentation.	Evaluate
CO3	Identify awareness on arbitrations and legal procedures	Apply
CO4	Identify the labour requirements in terms of tax and cost analysis.	Apply
CO5	Analyze labour regulations and their impact on managing of contract management.	Analyze

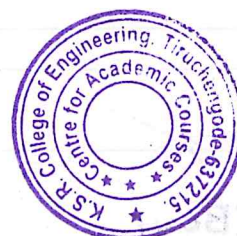
REFERENCES:

1. B.S. Patil, "Civil Engineering Contracts and Estimates," Universities Press, 4th Edition, 2018
2. Vidyanand, "Construction Contracts: Practice and Procedure," Lexis Nexis Butterworths, 5th Edition, 2017.
3. Ramachandran K., "Contractual Obligations and Legal Remedies in Construction Contracts," I.K. International Publishing, 2nd Edition, 2015.
4. P.C. Markanda, "Law Relating to Arbitration and Conciliation," Lexis Nexis, 9th Edition, 2020.

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	3	3	3	
CO3	2	-	2	2	3	
CO4	3	-	3	3	3	
CO5	2	-	3	3	3	
Avg.	3	-	3	3	3	

1-low, 2-Medium, 3-High


Chairman (BoS)



MA24T11	STATISTICAL METHODS AND QUEUEING THEORY	Category	L	T	P	SL	C
		FC	45	0	0	45	3

SEMESTER - I (M.E. : CONSTRUCTION ENGINEERING AND MANAGEMENT)

PREREQUISITE :

The students should have proficiency in basic mathematics including basic calculus such as derivatives and integrals, basic knowledge in statistics, random variables both discrete and continuous and their associated probability distributions

OBJECTIVES :

Develop the skills in Probability and Random Variables, correlation, regression and time series analysis, small and large sample tests through test of hypothesis, design of experiments for data analysis and various queueing models.

UNIT - I ONE DIMENSIONAL RANDOM VARIABLE

(9)

One dimensional Random Variable - Discrete and continuous random Variables – Probability mass function and probability density function – Expectations – Moments - Moment generating functions and their properties - Binomial, Poisson, Uniform, Exponential and Normal distributions.

UNIT - II CORRELATION, REGRESSION & TIME SERIES ANALYSIS

(9)

Karl Pearson's Co efficient of Correlation - Spearman's rank correlation - Regression analysis - Principle of least squares - Fitting straight line trends.

UNIT - III TESTING OF HYPOTHESIS

(9)

Sampling distributions - Type I and Type II errors - Test for significance of small samples: Student's t- test for testing single sample mean - two sample mean - Fiducial limits for population mean - Testing Significance of large samples (Z- test) for mean of a random sample - testing difference between means of two samples (Independent and dependent samples) - Chi square distribution - Independent of Attributes - F-Ratio test for equality of variances.

UNIT - IV DESIGN OF EXPERIMENTS

(9)

Analysis of variance – One-way and two-way classifications: Completely randomized design – Randomized block design – Latin square design

UNIT - V QUEUEING MODELS

(9)

Characteristics of Queuing Models – Kendall's notations - Little's formula - (M/M/1) : (∞ /FIFO) Single Server with infinite capacity – (M/M/C) : (∞ /FIFO) Multi Server with infinite capacity, - (M/M/1) : (N/FIFO) Single Server with finite capacity - (M/M/C) : (N/FIFO) Multi server with finite capacity.

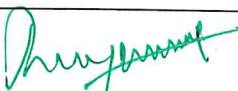
Lecture = 45, Tutorial = 0, Self Learning = 45 ; Total = 90 Periods

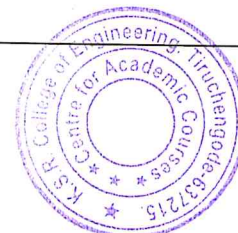
COURSE OUTCOMES : At the end of the course, the students will be able to

COs	Course Outcome	Cognitive Level
CO1	Solve the one dimensional random variable and Standard distributions.	Apply
CO2	Analyze correlation, regression and time series.	Analyze
CO3	Test the hypothesis of the samples and get the inference of the samples obtained from the experiments.	Apply
CO4	Design and analyze the experiments using the methods CRD, RBD, and LSD.	Analyze
CO5	Apply the concepts of queuing models in engineering fields.	Apply

TEXT BOOKS :

1. Gupta S C and Kapoor V K, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi, 2014.
2. Devore J L, "Probability and Statistics for Engineering and the Sciences", Cengage Learning, 8th Edition 2014.


Chairman (BoS)



REFERENCES :

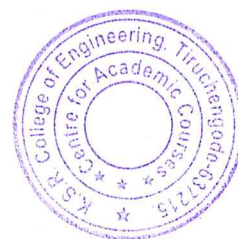
1. Taha H A, "Operations Research", Pearson Education, New Delhi, 9th Edition, 2012.
2. Gupta P K, Man Mohan, "Operations Research", Sulthan Chand & Sons, 6th Edition, 2020.
3. Kalavathy S, "Operations Research", Vikas Publishing House, Ahmedabad, 6th Edition, 2019.
4. Vohra N D, "Quantitative Techniques in Management", Tata Mc Graw Hill, New Delhi, 6th Edition, 2021.

Mapping of COs with POs and PSOs

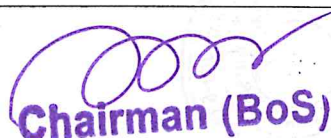
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	3	-	2	2	3
CO4	3	-	2	2	3
CO5	3	-	2	2	3

1 - Low, 2 - Medium, 3- High .


Chairman (BoS)

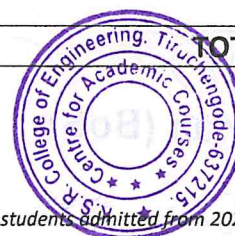


MA24T11	STATISTICAL METHODS AND QUEUING THEORY	Category	L	T	P	SL	C
		FC	45	0	0	45	3
(M.E. CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: The students should have proficiency in basic mathematics including basic calculus such as derivatives and integrals, basic knowledge in statistics, random variables both discrete and continuous and their associated probability distributions							
OBJECTIVES: • To understand the concepts of Probability and Random Variables. • To recall the basic probability concepts with respect to two dimensional random variables and gain knowledge on regression and correlation. • To apply the small / large sample tests through test of hypothesis. • To develop the skills in design of experiments for data analysis. • To acquire skills in analyzing queueing models.							
UNIT - I	ONE DIMENSIONAL RANDOM VARIABLE						9
One dimensional Random Variable - Discrete and continuous random Variables – Probability mass function and probability density function – Expectations – Moments - Moment generating functions and their properties - Binomial, Poisson, Uniform, Exponential and Normal distributions.							
UNIT - II	CORRELATION, REGRESSION & TIME SERIES ANALYSIS						9
Karl Pearson's Co efficient of Correlation - Spearman's rank correlation - Regression analysis - Principle of least squares - Fitting straight line trends.							
UNIT - III	TESTING OF HYPOTHESIS						9
Sampling distributions - Type I and Type II errors - Test for significance of small samples: Student's t- test for testing single sample mean - two sample mean - Fiducial limits for population mean - Testing Significance of large samples (Z- test) for mean of a random sample - testing difference between means of two samples (Independent and dependent samples) - Chi square distribution - Independent of Attributes - F-Ratio test for equality of variances.							
UNIT - IV	DESIGN OF EXPERIMENTS						9
Analysis of variance – One-way and two-way classifications: Completely randomized design – Randomized block design – Latin square design							
UNIT - V	QUEUEING MODELS						9
Characteristics of Queuing Models – Kendall's notations - Little's formula - (M/M/1) : (∞ /FIFO) Single Server with infinite capacity – (M/M/C) : (∞ /FIFO) Multi Server with infinite capacity, - (M/M/1) : (N/FIFO) Single Server with finite capacity - (M/M/C) : (N/FIFO) Multi server with finite capacity.							
TOTAL: 45 PERIODS							



Chairman (BoS)

K.S.R College of Engineering



Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Solve the one dimensional random variable and Standard distributions.	Understand
CO2	Analyze correlation, regression and time series.	Apply
CO3	Test the hypothesis of the samples and get the inference of the samples obtained from the experiments.	Apply
CO4	Design and analyze the experiments to obtain inferences.	Analyze
CO5	Apply the concepts of queuing models in engineering fields.	Apply

TEXT BOOKS:

1. Gupta S C and Kapoor V K, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi, 2014.
2. Devore J L, "Probability and Statistics for Engineering and the Sciences", Cengage Learning, 8th Edition 2014.

REFERENCES:

1. Taha H A, "Operations Research", Pearson Education, New Delhi, 9th Edition, 2012.
2. Gupta P K, Man Mohan, "Operations Research", Sulthan Chand & Sons, 6th Edition, 2020.
3. Kalavathy S, "Operations Research", Vikas Publishing House, Ahmedabad, 6th Edition, 2019.
4. Vohra N D, "Quantitative Techniques in Management", Tata Mc Graw Hill, New Delhi, 6th Edition, 2021.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	3	3
CO2	3	-	2	3	3
CO3	3	-	2	3	3
CO4	3	-	2	3	3
CO5	3	-	2	3	3
Avg.	3	-	2	3	3

1-Low, 2-Medium, 3-High

Chairman (BoS)

CN24P11	CONSTRUCTION ENGINEERING LABORATORY	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
A thorough understanding of concrete properties, including its composition, behavior under different conditions, and fundamental testing methods, is essential. Prior exposure to construction materials, concrete mix design methodologies, and relevant standards							
OBJECTIVES:							
To develop practical skills in designing, testing, and evaluating different types of concrete mixes and to understand the influence of mineral and chemical admixtures on fresh and hardened concrete properties for ensuring durability and performance in construction.							
List of Experiments:							
- Mix Design of Concrete as per Indian Standards (IS), American Concrete Institute (ACI), BS Method for high performance concrete - Mix Design of self-compacting concrete as per European Federation of National Associations Representing for Concrete (EFNARC) guidelines. - Flow characteristics of self-compacting concrete - Effect of minerals in concrete at fresh and hardened state with relevance to workability, strength and durability. - Effect of chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability. - Permeability tests on hardened concrete - Determination of in-situ strength and quality of concrete using - Rebound hammer - Ultrasonic pulse velocity tester							
PRACTICAL: 60, SELF LEARNING: 0, TOTAL: 60 PERIODS							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

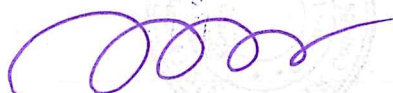
Course Outcome	Description	Cognitive Level	Exp
CO1	Explain the principles of mix design for conventional, high-performance, and self-compacting concrete as per national and international standards.	Understand	1,2
CO2	Describe the workability and flow characteristics of fresh concrete using appropriate tests and guidelines.	Understand	3,4
CO3	Analyze the effect of mineral and chemical admixtures on the strength, durability, and performance of concrete.	Analyze	5
CO4	Assess permeability and durability characteristics of hardened concrete through laboratory testing.	Understand	6
CO5	Apply non-destructive testing methods to determine in-situ quality and strength of concrete structures.	Apply	7

REFERENCES:

1. Neville, A. M., & Brooks, J. J. Concrete Technology. Prentice Hall, 2010.
2. Mindess, S., Young, J. F., & Darwin, D. Concrete. Pearson Education, 2003
3. EFNARC The European Guidelines for Self-Compacting Concrete. 2003
4. CI Committee 211. Guide for Selecting Proportions for High-Strength Concrete Using Portland Cement and Other Cementitious Materials. 2011

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	3
CO3	3	3	3	2	3
CO4	3	3	3	2	3
CO5	3	3	3	2	3
Avg.	3	3	3	2	3

1-Low, 2-Medium, 3-High


Chairman (BoS)



CN24P12	TECHNICAL PRESENTATION - I	Category	L	T	P	SL	C
		PCC	45	0	0	45	3

(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)**PREREQUISITE:**

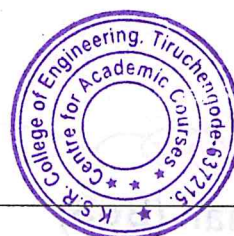
A foundational understanding of the relevant technical subject matter and prior coursework in communication or presentation skills. Students should also be familiar with basic research methodologies to effectively convey their ideas.

OBJECTIVES:

- To develop the ability to effectively search, analyze, and synthesize literature from journals and conference proceedings on selected research topics. The course enhances skills in preparing technical reports with structured abstracts and literature reviews, and delivering engaging presentations using tools like PowerPoint.
1. The students have to refer the journals and conference proceedings and collect the literature.
 2. The student can select a course-oriented topic.
 3. The students have to collect at least 30 research papers published in the last decades.
 4. Using OHP / Power Point, the student has to make presentation for 20 minutes followed by 10 minutes discussion.
 5. The student has to make five presentations in the semester.
 6. The student has to write a technical report for about 30 - 50 pages (Title page, one page Abstract, Review of Research paper under various sub - headings, concluding remarks and list of references).
 7. The technical report has to be submitted to the course coordinator one week before the final presentation.

PRACTICAL: 30, SELF LEARNING: 0, TOTAL: 30 PERIODS


Chairman (BoS)



COURSE OUTCOMES:

At the end of the course, the students will be able to:

Course Outcome	Description	Cognitive Level
CO1	Identify the area of interest of the student.	Apply
CO2	Identify the thrust areas by referring journals, conference proceedings etc.	Apply
CO3	Summarize literature collection.	Understand
CO4	Demonstrate his/her own ideas in the current topic.	Understand
CO5	Perceive about report writing and presentation.	Evaluate

REFERENCES:

1. Beall, J., and Thomas, G, "Research Presentation: A Guide for Students and Researchers", Academic Press, London, 2015.
2. McCarthy, P., and McCarthy, J., "Effective Communication Skills for Engineers and Scientists", Wiley, Hoboken, 2019.

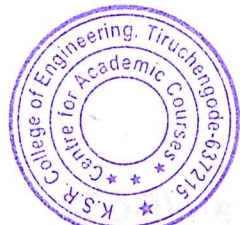
Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PSO1	PSO2
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	3	3	2	2
CO5	3	3	3	2	2
Avg.	3	3	3	2	2

1-Low, 2-Medium, 3-High



Chairman (BoS)



RM24T09	RESEARCH METHODOLOGY AND IPR	Category	L	T	P	SL	C
		RMC	45	0	0	45	3
(Common to ALL)							
PREREQUISITE: Basic understanding of research methodology and general awareness of legal and innovation-related frameworks.							
OBJECTIVE: To equip learners with the knowledge and skills to design and conduct research, analyze data effectively, and understand the fundamentals of intellectual property rights and patent processes.							
UNIT - I	RESEARCH DESIGN						(9)
Overview of research process and design – Use of secondary and exploratory data to answer the research question, Qualitative research, Observation studies – Experiments and surveys.							
UNIT - II	DATA COLLECTION AND SOURCES						(9)
Measurements: Measurement scales – Questionnaires and instruments – Sampling and Methods. Data – Preparing, Exploring, Examining and Displaying.							
UNIT - III	DATA ANALYSIS AND REPORTING						(9)
Overview of multivariate analysis – Hypotheses testing and measures of association – Presenting insights and findings using written reports and oral presentation.							
UNIT - IV	INTELLECTUAL PROPERTY RIGHTS						(9)
Intellectual Property – The concept of IPR, Evolution and development of the concept of IPR, IPR development process, Trade secrets, Utility models, IPR & Biodiversity, Role of WIPO and WTO in IPR establishments, Right of property, Common rules of IPR practices, Types and features of IPR agreement, Trademark, Functions of UNESCO in IPR maintenance.							
UNIT - V	PATENTS						(9)
Patents – objectives and benefits of patent – Concept, features of patent, Inventive step, Specification – Types of patent application, process E-filing – Examination of patent – Grant of patent, Revocation, Equitable Assignments. Licenses – Licensing of related patents – Patent agents – Registration of patent agents.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:					
At the end of the course, the students will be able to:					
COs	Course Outcome	Cognitive Level			
CO1	Develop a suitable research process to solve real-time problems.	Apply			
CO2	Apply appropriate methods to collect qualitative and quantitative data for analysis.	Apply			
CO3	Apply appropriate statistical tools to analyze data and solve research problems.	Apply			
CO4	Describe the types and features of intellectual property and its role in IPR establishment.	Understand			
CO5	Illustrate the patent procedures, E-filing, register of patents, and licensing of patents.	Understand			
TEXT BOOKS:					
1	Cooper Donald, R., Schindler Pamela, S., and Sharma, J.K., "Business Research Methods", Tata McGraw Hill Education, Eleventh Edition, 2012.				
2	Catherine J. Holland, Intellectual Property: Patents, Trademarks, Copyrights, Trade Secrets, Entrepreneur Press, 2007.				
REFERENCES:					
1	David Hunt, Long Nguyen, Matthew Rodgers, Patent Searching: Tools & Techniques, Wiley, 2007.				
2	The Institute of Company Secretaries of India, Statutory body under an Act of Parliament, Professional Programme Intellectual Property Rights, Law and Practice, September 2013.				
Mapping of COs with POs and PSOs					
COs/ POs	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	-	-	3
CO2	3	3	-	-	3
CO3	3	3	-	-	3
CO4	3	3	-	-	3
CO5	3	3	-	-	3
1 - Low, 2 - Medium, 3 - High					


Chairman (BoS)

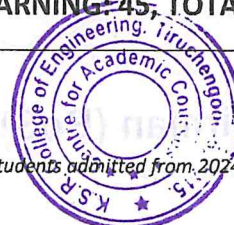


CN24T21	ADVANCED CONSTRUCTION TECHNIQUES	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Advanced Construction Techniques typically it includes foundational knowledge and skills that are essential for understanding and applying advanced methods in construction and understanding of structural analysis and design principles, including knowledge of materials, load-bearing structures, and basic engineering mechanics.							
OBJECTIVES: To provide knowledge and practical skills in advanced construction practices such as piling, concrete flooring, tall structure construction, and heavy-duty erection techniques. The course also covers advanced foundation and ground improvement methods for safety and durability, along with safe demolition and dismantling practices.							
UNIT - I	SUB-STRUCTURE CONSTRUCTION						(9)
Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunnelling techniques - Piling techniques - Driving well and Caisson - Sinking Cofferdam - Cable anchoring and Grouting - Driving diaphragm walls, sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - Well points - Dewatering and stand by plant equipment for underground open excavation.							
UNIT - II	SUPER-STRUCTURE CONSTRUCTION FOR BUILDINGS						(9)
Vacuum dewatering of concrete flooring - Concrete paving technology - Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections - Launching techniques - Suspended form work - Erection techniques of tall structures, large span structures - Launching techniques for heavy decks - Insitu pre stressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures.							
UNIT - III	CONSTRUCTION OF SPECIAL STRUCTURES						(9)
Erection of lattice towers and rigging of transmission line structures - Construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges - Launching and pushing of box decks - Advanced construction techniques for offshore structures - Construction sequence and methods in domes and pre stressed domes - Support structure for heavy equipment and conveyor and machinery in heavy industries - Erection of articulated structures, braced domes and space decks.							
UNIT - IV	REHABILITATION TECHNIQUES						(9)
Mud jacking grout through slab foundation - Micro piling for strengthening floor and shallow profile - pipeline laying - Protecting sheet piles, screw anchors - Sub grade water proofing, underpinning, crack stabilization techniques.							
UNIT - V	DEMOLITION TECHNIQUES						(9)
Types of demolition - Advanced techniques and sequence in demolition and dismantling - Equipment for demolition - Precaution measures of demolition.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							



Chairman (BoS)
K.S.R. College of Engineering

Applicable for the students admitted from 2024-2025 onwards



COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Explain the various processes and techniques involved in sub-structure construction.	Understand
CO2	Summarize the different methods used in super-structure construction.	Understand
CO3	Recall the construction process of special and offshore structures, focusing on the use of advanced machinery and equipment.	Remember
CO4	Identify the various rehabilitation techniques employed for strengthening structures.	Apply
CO5	Explain about the advanced demolition techniques carried out for dismantling a structure.	Understand

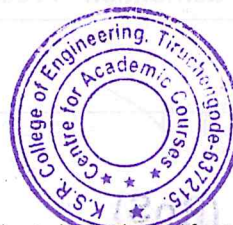
REFERENCES:

1. Jerry Irvine., Advanced Construction Techniques, CA Rocketr, Claremont, First Edition, 1984.
2. Roy Chudley, Roger Geeno, "Advanced Construction Technology"
3. Specifications of Handbook on Repair and Rehabilitation of RCC Buildings, Director general works, Central Public Works Department, Government of India, New Delhi, First Edition, 2011.
4. PS Gahlot & Sanjay Sharma, "Building repair and maintenance management", CBS Publications.2006

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-Low, 2-Medium, 3-High

Chairman (BoS)



CN24T22	PROJECT FORMULATION AND APPRAISAL	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Students should have a solid understanding fundamental economic principle, including supply and demand, market structures, and the role of government in the economy.							
OBJECTIVES:							
To understand the fundamental concepts of project formulation, including capital investments and project identification, analyze project cash flows with consideration of the time value of money, evaluate and apply appraisal techniques such as NPV, BCR, IRR, ARR, and payback period, gain insights into project financing mechanisms, and examine private sector participation models in infrastructure development such as BOT, BOLT, and BOOT.							
UNIT - I	PROJECT FORMULATION						(9)
Concepts - Capital investments - Generation and Screening of Project Ideas - Project identification - Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno - Economic Feasibility Report, Detailed Project Report - Different Project Clearances required							
UNIT - II	PROJECT COSTING						(9)
Project Cash Flows - Type of cash flow - Time Value of Money - Cost of Capital-Problems							
UNIT - III	PROJECT APPRAISAL						(9)
NPV - BCR - IRR - ARR - Urgency - Pay Back Period - Assessment of Various Methods - Indian Practice of Investment Appraisal - International Practice of Appraisal - Analysis of Risk - Different Methods - Selection of a Project and Risk Analysis in Practice							
UNIT - IV	PROJECT FINANCING						(9)
Project Financing - Means of Finance - Financial Institutions - Special Schemes - Key Financial Indicators - Ratios							
UNIT - V	PRIVATE SECTOR PARTICIPATION						(9)
Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - Scope of Technology Transfer							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

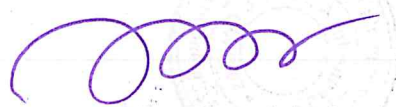
COs	Description	Cognitive Level
CO1	Understand the fundamental concepts of project formulation	Understand
CO2	Analyze cost report on the project.	Analyze
CO3	Evaluate Investment Appraisal the risk analysis and its assessment in practice.	Evaluate
CO4	Analyze Financial aspects of projects.	Analyze
CO5	Explain the implementations of Private Sector Participation in construction projects.	Understand

REFERENCES:

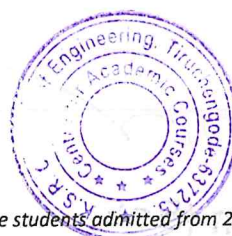
1. Frank Harrison, E., the Managerial Decision Making Process, Houghton Mifflin Co, Boston, Fifth Edition, 2005.
2. United Nations Industrial Development Organisation (UNIDO) Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction), Bombay, 2005.
3. Barcus, S.W. and Wilkinson.J.W., Hand Book of Management Consulting Services, McGraw Hill, New York, 1995
4. <http://www.nptel.ac.in/courses/112102107/4>

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-Low, 2-Medium, 3-High


Chairman (BoS)

K.S.R College of Engineering



Applicable for the students admitted from 2024-2025 onwards

CN24T23	CONSTRUCTION PLANNING, SCHEDULING AND CONTROL	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Understanding of construction processes, terminology, and management principles. Knowledge of project management concepts, including scope, time, and cost management. Understanding of legal issues and regulations related to construction projects.							
OBJECTIVES:							
To develop comprehensive construction plans by mastering fundamental concepts, apply scheduling techniques such as the Critical Path Method, float management, and advanced practices, manage and control project costs through effective budgeting, ensure quality and safety by organizing appropriate measures, and manage project information by accurately handling and utilizing various types of project data.							
UNIT - I	CONSTRUCTION PLANNING						(9)
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.							
UNIT - II	SCHEDULING PROCEDURES AND TECHNIQUES						(9)
Construction Schedules - Critical Path Method - Scheduling Calculations - Float - Presenting Project Schedules - Scheduling for Activity-on-Node and with Leads, Lags, and Windows - Scheduling with Resource Constraints and Precedence - Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs - Improving the Scheduling Process.							
UNIT - III	COST CONTROL, MONITORING AND ACCOUNTING						(9)
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							
UNIT - IV	QUALITY CONTROL AND SAFETY DURING CONSTRUCTION						(9)
Quality and Safety Concerns in Construction - Organizing for Quality and Safety - Work and Material Specifications - Total Quality Control - Quality Control by Statistical Methods - Statistical Quality Control with Sampling by Attributes - Statistical Quality Control with Sampling by Variables - Safety.							
UNIT - V	ORGANIZATION AND USE OF PROJECT INFORMATION						(9)
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.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Examine the development of construction planning and its activities.	Analyze
CO2	Explain the process of scheduling of activities and its operation procedure.	Understand
CO3	Demonstrate about the Problems involved in cost controlling and accounting.	Understand
CO4	Interpret the quality control and safety during construction.	Understand
CO5	Explain the concepts of database management systems and its application involved in construction.	Understand

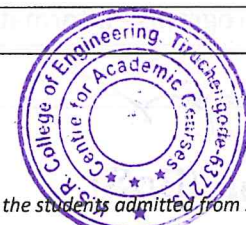
REFERENCES:

1. Tom Stephenson, "Planning, Scheduling, and Control of Construction Projects", American Technical Publishers, 1st Edition, 2018
2. James Lewis, "Project Planning, Scheduling, and Control, Sixth Edition: The Ultimate Hands-On Guide to Bringing Projects in On Time and On Budget", McGraw-Hill Education, 6th Edition, 2023.
3. Vijay Bansal, "Project Management: Planning and Scheduling Techniques", Routledge, 1st Edition, 2023.
4. <https://archive.nptel.ac.in/courses/105/106/105106149/>

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	3	3
CO2	3	-	3	3	3
CO3	3	-	3	3	3
CO4	3	-	3	3	3
CO5	3	-	3	3	3
Avg.	3	-	3	3	3

1-Low, 2-Medium, 3-High

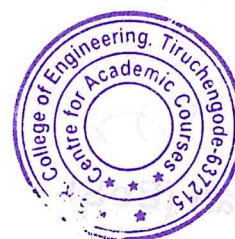

Chairman (BoS)
 K.S.R College of Engineering


 Applicable for the students admitted from 2024-2025 onwards

CN24P21	ADVANCED COMPUTING TECHNIQUES LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	60	0	2
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Basic proficiency in using project management and scheduling software tools, including familiarity with their features and functionalities. The knowledge of designing and implementing information systems, including an understanding of database concepts and user interface design principles.							
OBJECTIVES: To gain skills in preparing detailed and competitive bids or proposals with cost estimation and documentation, use Microsoft Project for scheduling, generate and interpret project status reports with performance metrics, design and implement inventory management systems, and develop simulation models to analyze and manage risks in construction projects.							
List of Exercise/Experiments: (Min 15) - Quantity take off, Preparation and delivery of the bid or proposal of an engineering construction project. - Design of a simple equipment information system for a construction project. - Scheduling of a construction project using software. - Scheduling of a construction project using tools like MS project scheduling systems. - Resource allocation for construction project and levelling of the resources. - Monitoring of the construction project, tracking and taking reports using tools like MS project scheduling systems. - Inventory management system for the given construction project. - Simulation models for project risk analysis							
LIST OF SOFTWARES - MS OFFICE - QE PRO - MS PROJECT - PRIMAVERA SOFTWARE							
PRACTICAL: 60, SELF LEARNING: 0, TOTAL: 60 PERIODS							



Chairman (BoS)



COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Description	Cognitive Level	Exp
CO1	Apply computational techniques in optimization and sequencing problems	Apply	1, 2
CO2	Demonstrate using management tools	Understand	3,4
CO3	Identify the resources for construction projects	Apply	5
CO4	Organize the volume of activities involved in a project	Apply	6,7
CO5	Analyze modern technology for information.	Analyze	8

REFERENCES:

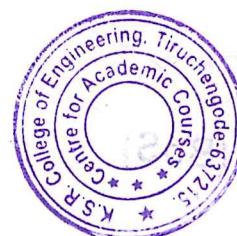
1. Cheng, J., & Wang, H. "Finite Element Analysis: Theory and Application with ANSYS", Springer, 2nd Edition.
2. M. A. Ashworth, "Cost Studies of Buildings," 6th Edition, Pearson Education.
3. R. M. Gido, "Successful Project Management," Cengage Learning.
4. P. J. Edwards, "Project Risk Management: A Practical Implementation Approach," CRC Press.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	2	3	3	3
CO3	3	2	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Avg.	3	3	3	3	3

1-Low, 2-Medium, 3-High



Chairman (BoS)



CN24P22	TECHNICAL PRESENTATION - II	Category	L	T	P	SL	C
		PCC	0	0	30	0	1
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A solid grasp of the relevant technical concepts, along with prior coursework in communication or presentation skills, is essential. Additionally, familiarity with basic research methodologies will help students effectively convey their ideas in a technical presentation context.							
OBJECTIVES: - To gather relevant literature and select a course-oriented topic aligned with personal interests and current field trends, compile at least 30 research papers from the last decade, develop and deliver a 20-minute presentation with a 10-minute discussion using OHP or PowerPoint, and prepare a 30–50 page technical report including a title page, abstract, literature review, conclusions, and references. - The students have to refer the journals and conference proceedings and collect the literature. - The student can select a course oriented topic. - The students have to collect at least 30 research papers published in the last decades. - Using OHP / Power Point, the student has to make presentation for 20 minutes followed by 10 minutes discussion. - The student has to make five presentations in the semester. - The student has to write a technical report for about 30 - 50 pages (Title page, one page Abstract, Review of Research paper under various sub - headings, concluding remarks and list of references). - The technical report has to be submitted to the course coordinator one week before the final presentation.							
PRACTICAL: 30, SELF LEARNING: 0, TOTAL: 30 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Identify the area of interest of the student.	Apply
CO2	Identify the thrust areas by referring journals, conference proceedings etc.	Apply
CO3	Summarize literature collection.	Understand
CO4	Demonstrate his/her own ideas in the current topic.	Understand
CO5	Perceive about report writing and presentation.	Evaluate

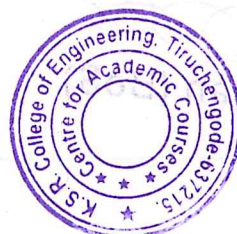
REFERENCES:

1. Booth, W.C., Colomb, G.G., & Williams, J.M. (2008), "The Craft of Research", University of Chicago Press.
2. Day, R.A., & Gastel, B. (2012), "How to Write and Publish a Scientific Paper", Cambridge University Press.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	3
CO3	3	3	3	2	3
CO4	3	3	3	2	3
CO5	3	3	3	2	3
Avg.	3	3	3	2	3

1-Low, 2-Medium, 3-High


Chairman (BoS)



CN24T31	CONSTRUCTION PROJECT MANAGEMENT	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Understanding of fundamental construction processes and methodologies, including knowledge of various types of construction projects and basic understanding of financial principles related to budgeting, cost estimation, and financial analysis in construction projects							
OBJECTIVES:							
To understand the project life cycle, types of construction, and associated roles- analyze modern trends in project management and strategic planning- integrate design and construction- evaluate historical perspectives on labor productivity and factors affecting job-site efficiency- and develop skills in cost estimation techniques for various costs associated with constructed facilities.							
UNIT - I	THE OWNERS' PERSPECTIVE					(9)	
Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers							
UNIT - II	ORGANIZING FOR PROJECT MANAGEMENT					(9)	
Project Management - Modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants -Traditional Designer - Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team							
UNIT - III	DESIGN AND CONSTRUCTION PROCESS					(9)	
Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment							
UNIT - IV	LABOUR, MATERIAL AND EQUIPMENT UTILIZATION					(9)	
Historical Perspective - Labor Productivity - Factors Affecting Job - Site Productivity - Labor Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks							
UNIT - V	COST ESTIMATION					(9)	
Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							


Chairman (BoS)
 K.S.R College of Engineering

Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Develop knowledge of Construction Professional Services, Finance facilities, Legal and regulatory requirements, Role of contractors and Project Managers.	Apply
CO2	Identify the basic cost flows, Planning and project budget.	Apply
CO3	Demonstrate about the Feasible terms relating to construction.	Understand
CO4	Explain the knowledge on utilization of labour, materials and equipment.	Understand
CO5	Identify the cost associated terms in construction project.	Apply

REFERENCES:

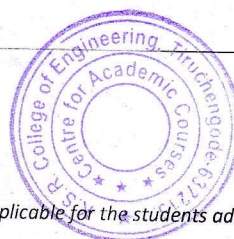
1. Frederick Gould, E. and Nancy Eleanor Joyce., Construction Project Management, Pearson Education, London, Fifth Edition, 2011.
2. George Ritz, J., Total Construction Project Management - McGraw-Hill Inc, New York, Second Edition, 2013.
3. Choudhury. S., Project Management, Tata McGraw-Hill Publishing Company, New Delhi, First Edition, 1988.
4. Keoki Sears, S. Glenn Sears, S. and Richard Clough, H., Construction Project Management A Practical Guide to Field Construction Management, Wiley Publication, New Jersey, First Edition, 2010.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-Low, 2-Medium, 3-High

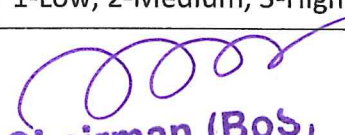

Chairman (BoS)

K.S.R College of Engineering

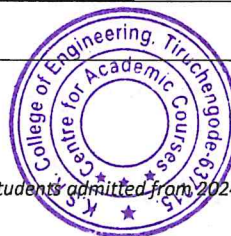


Applicable for the students admitted from 2024-2025 onwards

CN24P31	PROJECT WORK PHASE - I	Category	L	T	P	SL	C
		EEC	0	0	180	0	6
PREREQUISITE: Basic understanding of research methodology and technical knowledge in the core subject area.							
OBJECTIVES: - To assign faculty supervisors for guiding students in identifying and defining research problems or case studies relevant to their discipline. The course supports literature review, methodology formulation, and effective execution of project work. - Every student shall have a supervisor who is the member of the faculty of the institution. Selection of faculty supervisor has to be completed within the first two weeks from the day of beginning of third semester. - The students should make discussion with his supervisor for selecting topic. - In consultation with supervisor, student has to collect research papers and journals. - Preferably it can be an experimental work or it can be a case study. - A detailed study of the collected literatures to be carried out. - The methodology should be framed and works carried out based on the framed methodology. - Phase - I project report should be submitted at the end of the semester as per guidelines. - This project report should be evaluated jointly by external and internal examiners.							
PRACTICAL: 180, SELF LEARNING: 0, TOTAL: 180 PERIODS							
COURSE OUTCOMES: At the end of the course, the students will be able to:							
COs	Course Outcome						Cognitive Level
CO1	Identify a suitable project topic through consultation with a faculty supervisor.						Apply
CO2	Collect and analyze relevant literature to understand the research background.						Analyze
CO3	Develop a structured methodology to carry out experimental work or case studies.						Create
CO4	Prepare a detailed project report following academic and institutional guidelines.						Analyze
CO5	Demonstrate research skills and project planning through evaluation by internal and external examiners.						Understand
		Mapping of COs with POs and PSOs					
		COs/ POs	PO1	PO2	PO3	PO4	PO5
		CO1	2	2	2	2	2
		CO2	3	2	3	3	2
		CO3	3	2	3	3	3
		CO4	2	3	2	2	2
		CO5	3	2	3	3	2
		Avg.	3	2	3	3	2
1-Low, 2-Medium, 3-High							


Chairman (BoS,
K.S.R. College of Engineering

Applicable for the students admitted from 2024-2025 onwards



COURSE OUTCOMES:		At the end of the course, the students will be able to:	
COs	Course Outcome	Cognitive Level	
CO1	Identify a suitable project topic through consultation with a faculty supervisor.	Apply	
CO2	Collect and analyze relevant literature to understand the research background.	Analyze	
CO3	Develop a structured methodology to carry out experimental work or case studies.	Create	
CO4	Prepare a detailed project report following academic and institutional guidelines.	Analyze	
CO5	Demonstrate research skills and project planning through presentation by internal and external examiners.	Understand	

Mapping of COs with POs and PSO					
COs/POs	PO1	PO2	PO3	PO4	PSO
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Avg.	3	3	3	3	3

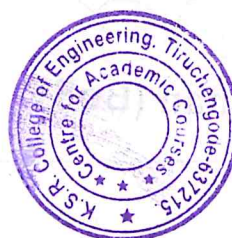
CN24P32	PRACTICAL TRAINING	Category	L	T	P	SL	C
		EEC	0	0	30	0	1
PREREQUISITE:							
OBJECTIVES:							
To enable students to identify suitable training domains with faculty guidance and explore relevant literature and industrial resources for applied learning. The course offers practical exposure through fieldwork or case study analysis, linking industry practices with academic concepts.							
- Students should consult with their faculty in-charge to choose the domain or area of industry for their practical training. - In consultation with the faculty, students must gather relevant literature, technical manuals, and industry reports related to the training domain. - The practical training may preferably involve field/industrial work or can be a case study-based analysis in a relevant area of civil/Construction engineering management. - A comprehensive study of the collected materials and current industry practices must be undertaken to understand the background and recent developments in the chosen domain. - Based on literature and industry requirements, a methodology must be developed for documenting and analysing the training process and experiences. - A detailed Practical Training Report must be submitted at the end of the semester, formatted as per institutional guidelines. - The report will be evaluated jointly by internal and external examiners, considering the technical content, learning outcomes, and presentation quality.							
PRACTICAL: 30, SELF LEARNING: 0, TOTAL: 30 PERIODS							
 Chairman (BoS) 							

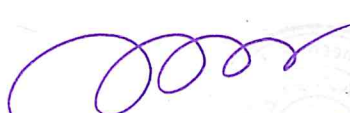
COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level			
CO1	Identify and select an appropriate domain of practical training through faculty consultation.	Apply			
CO2	Collect and study literature, manuals, and technical documentation related to the training domain.	Understand			
CO3	Analyze technical processes and practices observed during field/industrial work.	Analyze			
CO4	Develop a detailed technical report based on the findings and methodologies adopted.	Create			
CO5	Present training outcomes clearly and professionally, justifying observations and conclusions.	Evaluate			
Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	1	2	2	2
CO2	2	2	2	3	2
CO3	3	2	3	3	3
CO4	2	3	3	3	2
CO5	1	3	2	2	3
Avg.	2	2	2	3	2
1-Low, 2-Medium, 3-High					



Chairman (BoS)



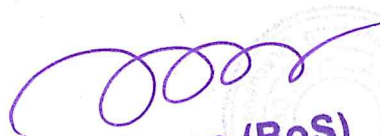
CN24P41	PROJECT WORK PHASE - II	Category	L	T	P	SL	C
		EEC	0	0	360	0	12
PREREQUISITE: Basic understanding of research methodology and technical knowledge in the core subject area.							
OBJECTIVES: - To provide each student with a faculty supervisor for continuous guidance in identifying and defining a research problem or case study relevant to their discipline. The course supports literature review, methodology development, and effective execution of the project work. - Every student shall have a supervisor who is the member of the faculty of the institution. Selection of faculty supervisor has to be completed within the first two weeks from the day of beginning of third semester. - The students should make discussion with his supervisor for selecting topic. - In consultation with supervisor, student has to collect research papers and journals. - Preferably it can be an experimental work or it can be a case study. - A detailed study of the collected literatures to be carried out. - The methodology should be framed and works carried out based on the framed methodology. - Phase - I project report should be submitted at the end of the semester as per guidelines. - This project report should be evaluated jointly by external and internal examiners.							
PRACTICAL: 360, SELF LEARNING: 0, TOTAL: 360 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

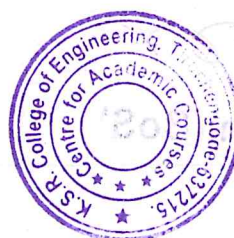
COs	Course Outcome	Cognitive Level
CO1	Identify a suitable project topic through consultation with a faculty supervisor.	Apply
CO2	Collect and analyze relevant literature to understand the research background.	Analyze
CO3	Develop a structured methodology to carry out experimental work or case studies.	Create
CO4	Prepare a detailed project report following academic and institutional guidelines.	Analyze
CO5	Demonstrate research skills and project planning through evaluation by internal and external examiners.	Understand

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	2	2	2	2	2	
CO2	3	2	3	3	2	
CO3	3	2	3	3	3	
CO4	2	3	2	2	2	
CO5	3	2	3	3	2	
Avg.	3	2	3	3	2	

1-Low, 2-Medium, 3-High



Chairman (BoS)



PROFESSIONAL ELECTIVE COURSES

PROFESSIONAL ELECTIVE COURSES

CN24E01	MANAGEMENT INFORMATION SYSTEM	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Familiarity with basic programming concepts and methodologies is essential, as well as an awareness of how information systems support business processes and decision-making Knowledge of project management principles, including the software development life cycle							
OBJECTIVES: To understand the role of information systems in managing organizations, analyze their contribution to decision-making, design and implement systems that support business functions, explore ethical, social, and security issues, and study the impact of emerging technologies on information systems management.							
UNIT - I	INFORMATION SYSTEMS	(9)					
Information Systems - Establishing the Framework - Business Models – Information System Architecture - Evolution of formation Systems.							
UNIT - II	MODERN INFORMATION SYSTEM	(9)					
Modern Information System - Systems Development-life Cycle - Structured Methodologies - Designing Computer Based methods, Procedures Control - Designing Structured Programs.							
UNIT - III	INTEGRATED CONSTRUCTION MANAGEMENT	(9)					
Integrated Construction Management - Information System- Project Management-Information System - Functional Areas finance, Marketing Production, Personnel - levels, Decision Support System (DSS), Executive information system (EIS), ES - Comparison Concepts and Knowledge representation - Managing International Information System							
UNIT - IV	CODING TECHNIQUES	(9)					
Control -Testing Security- Coding Techniques - Defection of Error – Validating – Cost Benefit Analysis -Assessing the value and risk of Information System.							
UNIT - V	SOFTWARE ENGINEERING	(9)					
Software engineering qualities - Design-Production - Service, Software Specification - Software Metrics, Software quality assurance - Systems Methodology - Objectives - Time and Logic, Knowledge and Human Dimension -Software life cycle models - Verification and Validation.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOME:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Infer the knowledge on information systems in frame work model and Business model.	Understand
CO2	Identify and apply the suitable Computer Based methods.	Apply
CO3	Construct the information systems models to project management by DSS, EIS, and ES.	Apply
CO4	Appraise the cost, value and risk of information system.	Evaluate
CO5	Identify different types of software for verification and validation.	Apply

REFERENCES:

1. Kenneth C. Laudon and Jane P. Laudon, "Management Information Systems: Managing the Digital Firm," Pearson, 17th Edition, 2023.
2. Gordon Davis. and Margrethe Olson., Management Information System: Conceptual Foundations Structure and Development, McGraw Hill, New Delhi, Second Edition, 2017
3. Joyce J, Elam., Case series for Management Information Systems, Pearson custom publishing, New York, First Edition, 2006.
4. Ralph Sprague, H. and Huge J, Watson., Decision Support for Managers, Prentice Hall India, New Delhi, First Edition, 2006.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E02	BUILDING SERVICES	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
To study the elements of building services like water supply sanitation, electrical installations air conditioning, and fire safety							
OBJECTIVES:							
To study the components of water supply and sanitation arrangements, electrical installations, air conditioning, and fire safety in buildings- and to explore the concepts of intelligent and smart buildings with a focus on building automation.							
UNIT - I	WATER SUPPLY SYSTEMS						(9)
Water quality, Purification and treatment- water supply systems-distribution systems in small towns - types of pipes used- laying jointing ,testing-testing for water tightness plumbing system for building-internal supply in buildings - municipal bye laws and regulations - Rain Water Harvesting - Sanitation in buildings-arrangement of sewerage systems in housing -pipe systems-storm water drainage from buildings - septic and sewage treatment plant - collection, conveyance and disposal of town refuse systems							
UNIT - II	WIRING SYSTEMS						(9)
Types of wires, wiring systems and their choice - Planning electrical wiring for building - Main and distribution boards - Transformers and switch gears - Modern theory of light and colour - Synthesis of light - Luminous flux - Candela - Lams of illumination - Lighting design - Design for modern lighting.							
UNIT - III	VENTILATION AND ITS IMPORTANCE						(9)
Ventilation and its importance - Natural and artificial systems - Window type and packaged air-conditioners - Chilled water plant - Fan coil systems-Water piping - Cooling load - Air conditioning systems for different types of buildings - Protection against Fire to be caused by A.C.Systems.							
UNIT - IV	SAFETY REGULATIONS						(9)
Causes of fire in buildings - Safety regulations - NBC - Planning considerations in buildings like Non-combustible materials, Construction, staircases and A.C. systems, Special features required for physically handicapped and elderly in building types - Heat and smoke detectors - Dry and wet risers - Automatic sprinklers							
UNIT - V	INTELLIGENT BUILDINGS						(9)
Intelligent buildings - Building Automation - Smart buildings - Building services in high rise buildings - Green buildings-Energy efficient buildings for various zones - Case studies of residence, office buildings and other buildings in each zone.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							



Chairman (BoS)

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Design and evaluate water supply and distribution systems for small towns	Create
CO2	Plan and implement electrical wiring systems in buildings, incorporating modern lighting design principles	Create
CO3	Understand the principles and importance of ventilation in buildings, including the selection and application of appropriate air conditioning systems	Understand
CO4	Apply safety regulations related to fire prevention and safety in buildings, including planning considerations	Apply
CO5	Analyze and design intelligent building systems, focusing on automation, energy efficiency, and sustainability practices	Analyze

REFERENCES:

1. Fair G.M., Geyer J.C. and Okun .D, "Water and waste Engineering", Vol. II, John Wiley & sons, Inc., New York. 2008.
2. Hopkinson .R.G and Kay .J .D, "The Lighting of buildings", Faber and Faber, London, 2009.
3. "Hand book for Building Engineers in Metric systems", NBC, New Delhi, 2008.
4. William H.Severns and Julian R.Fellows, "Air conditioning and refrigeration", John Wily and sons, London, 2008.

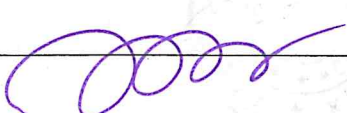
Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	2	3
CO2	3	-	3	2	3
CO3	3	-	3	2	3
CO4	3	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)

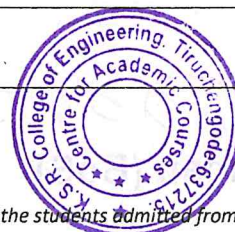


CN24E03	SAFETY PRACTICES AND MANAGEMENT	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Students should have understanding of fundamental construction processes, including common practices, tools, and equipment used in the industry.							
OBJECTIVES:							
To understand and implement construction safety management by identifying accident causes, analyzing effective safety programs and contractual obligations, fostering a strong safety culture, examining prevention strategies and associated costs, linking safety with productivity, and evaluating safe practices for handling various equipment and tools.							
UNIT - I	CONSTRUCTION ACCIDENTS						(9)
Construction Accidents - Construction Safety Management: Importance – Causes of Accidents, Safety Measures – Environmental Issues in Construction – Construction Industry related laws. Human Factors in Construction Safety - Legal and Financial aspects of accident in Construction - Occupational and Safety Hazard Assessment.							
UNIT - II	SAFETY PROGRAMMES AND CONTRACTUAL OBLIGATIONS						(9)
Safety Programmes – Construction safety – Element of effective safety programmes – job –site assessment – Safety meetings – Safety Incentives. Contractual Obligations – Safety in Construction Contracts – Substance abuse – Safety Record keeping.							
UNIT - III	DESIGNING FOR SAFETY						(9)
Safety Culture - Safe Workers - Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety - Safety Personnel - Sub contractual Obligation - Project Coordination and Safety Procedures - Workers Compensation.							
UNIT - IV	OWNER'S AND DESIGNER'S OUTLOOK						(9)
Accident Prevention - Cost of Accidents - Safety and Productivity - Safety Provision in the Factories act - Accident Reporting Investigation and Statistics - Total loss control and damage control - Safety sampling - Safety audit - Critical incidents technique - Safety equipment - Planning and Site preparation - safety system of storing construction materials - excavation - Blasting - Timbering - Scaffolding - Safe use of Ladder - Safety in Welding.							
UNIT - V	SAFETY IN HANDLING EQUIPMENT						(9)
Safety in hand tools - Safety in grinding - Hoisting Apparatus and Conveyors - Safety in the Use of Mobile Cranes - Manual Handling - Safety in Demolition work - Trusses, Girders and beams - First aid - Fire hazard and Prevention Methods - Interesting experience at the construction site against the fire accident.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							



Chairman (BoS)

K.S.R College of Engineering



Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Define all staff their accountabilities and responsibilities for the development and delivery of safety.	Remember
CO2	Identify that all staff is provided with adequate and appropriate safety information and training.	Apply
CO3	Design the safety working environment	Create
CO4	Develop the necessary training to build and maintain a meaningful operational safety leadership skill.	Apply
CO5	Make use of the measurement of the organizational safety performance and safety targets are in place.	Apply

REFERENCES:

1. Tim Howarth. and Paul Watson., Construction Safety Management, Wiley-Blackwell Publishing, New Jersey, First Edition, 2009.
2. Richard Coble, J. Jimmie Hinze. And Theo C. Haupt., Construction Safety and Health Management, Prentice Hall Inc., New Jersey, First Edition, 2009.
3. Alan Griffith. and Tim Howarth., Construction Health and Safety Management, CRC Press, Florida, First Edition, 2014.
4. Handbook On Construction Safety Practice, SP – 70, BIS, 2001.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E04	BUSINESS ECONOMICS AND FINANCE MANAGEMENT	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Basic knowledge of financial principles, accounting concepts, and introductory mathematics. Familiarity with financial statements and accounting terminology is recommended. Prior coursework in finance or accounting is advantageous but not required.							
OBJECTIVES: To apply financial management principles such as time value of money and interest calculations, compare investment proposals using various analysis techniques, evaluate alternatives in areas like real estate and equipment replacement, manage funds through project finance, working capital, and international finance, and understand management accounting principles, financial statements, and accounting ratios.							
UNIT - I	BASIC PRINCIPLES						(9)
Time Value of Money - Cash Flow diagram - Nominal and effective interest- continuous interest. Single Payment Compound Amount Factor (P/F,F/P) - Uniform series of Payments (F/A,A/F,F/P,A/P) - Problem time zero (PTZ) - equation time zero (ETZ) - Constant increment to periodic payments - Arithmetic Gradient(G), Geometric Gradient (C).							
UNIT - II	COMPARING ALTERNATIVES PROPOSALS						(9)
Comparing alternatives - Present Worth Analysis - Annual Worth Analysis - Future Worth Analysis - Rate of Return Analysis (ROR) - Incremental Rate of Return (IROR) Analysis - Benefit/Cost Analysis - Break Even Analysis.							
UNIT - III	EVALUATING ALTERNATIVE INVESTMENTS						(9)
Real Estate - Investment Property - Equipment Replace Analysis - Depreciation - Tax before and after depreciation - Value Added Tax (VAT) - Inflation							
UNIT - IV	FUNDS MANAGEMENT						(9)
Project Finance - Sources of finance - Long-term and short -term finance - Working Capital Management - Inventory valuation - Mortgage Financing - International financial management foreign currency management.							
UNIT - V	FUNDAMENTALS OF MANAGEMENT ACCOUNTING						(9)
Management accounting - Financial accounting principles - Basic concepts - Financial statements - Accounting ratios - Funds flow statement - Cash flow statement.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Understand financial management principles: Apply interest rates and cash flow diagrams to financial scenarios.	Understand
CO2	Apply financial analysis techniques: Use methods like Present Worth and Rate of Return Analysis to evaluate investments.	Apply
CO3	Evaluate investment alternatives: Assess impacts of real estate, equipment replacement, and financial factors.	Evaluate
CO4	Utilize knowledge of project finance, working capital, and international finance.	Apply
CO5	Understand management accounting principles: Interpret financial statements and calculate accounting ratios.	Understand

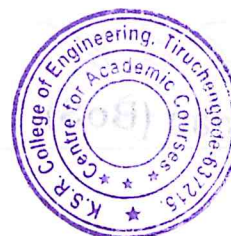
REFERENCES:

- Blank, L.T., and Tarquin, A.J, "Engineering Economy", McGraw-Hill Book Co., 7th edition, 2011
- Collier, C., and GlaGola, C., "Engineering Economics & Cost Analysis", Cengage Learning, 4th edition, 2015
- Patel, B.M., Project Management: Strategic Financial Planning, Evaluation, and Control, second edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2017
- Steiner, H.M., Engineering Economic Principles, Third edition, McGraw-Hill Education, New York, 2020.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E05	PAVEMENT ENGINEERING	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Basic understanding of civil engineering materials and construction practices. Familiarity with transportation engineering concepts and material testing methods.							
OBJECTIVES:							
To understand the properties and selection of materials for flexible and rigid pavements, explore the mechanical properties and testing of bituminous mixtures, comprehend pavement design, construction practices, and quality assurance techniques, gain knowledge of road construction machinery, and study advanced pavement engineering concepts including sustainable materials and techniques.							
UNIT - I	MATERIALS FOR FLEXIBLE AND RIGID PAVEMENTS					(9)	
Classification, testing, applications of road making materials - Aggregates - Road binders - Bitumen – Cement - Selection of Cement.							
UNIT - II	PROPERTIES OF BITUMINOUS MIXTURES					(9)	
Resistance of bituminous mixtures to permanent deformation - Flexibility and brittleness - Common mechanical tests - Permeability characteristics - Weathering of bituminous road surfacing - Adhesion of bituminous binders to road aggregates - Effect of aggregate size in bituminous courses - Temperature susceptibility of bituminous courses - Design of bituminous mixes.							
UNIT - III	PROPERTIES OF PAVEMENT AND CONSTRUCTION PRACTICE					(9)	
Properties of fresh and hardened concrete - Laboratory tests - Design of concrete mixes for Pavement Control - Construction of various layers in rigid and flexible pavements - Quality assurance during construction - Sampling and analysis.							
UNIT - IV	MACHINERIES FOR ROAD CONSTRUCTION					(9)	
Road making machineries - Road formation, Bituminous constructions - Road surface evaluation							
UNIT - V	ADVANCEMENTS IN PAVEMENT ENGINEERING					(9)	
Methods to improve bitumen quality - Rheological and chemical additives - Polymer modified bitumen - Super pave concepts - Recycling of bituminous courses - Smart materials for cement concrete pavement - Use of admixtures, waste materials and fibres - Pervious Concrete.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Construct the strength and durability of pavement materials.	Apply
CO2	Apply the concepts of bituminous courses in pavement construction.	Apply
CO3	Explain and account for climatic factors in pavement design and analysis	Understand
CO4	Relate the mechanisms of pavement deterioration and identify distress types	Remember
CO5	Construct pavement preservation techniques	Apply

REFERENCES:

1. Khanna S.K. and Justo C.E.G., "Highway Engineering," Nem Chand & Brothers, 10th Edition, 2017.
2. Huang Y.H., "Pavement Analysis and Design," Pearson Education, 2nd Edition, 2008.
3. Kadiyali L.R., "Principles and Practice of Highway Engineering," Khanna Publishers, 7th Edition, 2019.
4. Srinivasa Kumar R., "Pavement Design," University Press, 1st Edition, 2013.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E06	QUANTITATIVE TECHNIQUES IN MANAGEMENT	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A solid foundation in basic mathematics and statistics is necessary. Understanding of fundamental economic principles and business management concepts will be beneficial. Familiarity with introductory financial and production management principles is also recommended.							
OBJECTIVES: This course applies mathematical models like linear programming and duality to optimize decision-making in complex systems. It covers managing financial performance and investment decisions through working capital management, discounted cash flow, and capital budgeting. It also examines economic factors such as cost concepts, pricing strategies, and competitive behavior using game theory.							
UNIT - I	OPERATIONS RESEARCH						(9)
Introduction to Operations Research - Linear Programming - Graphical and Simplex Methods, Duality and Post - Optimality Analysis - Transportation and Assignment Problems.							
UNIT - II	PRODUCTION MANAGEMENT						(9)
Inventory Control - Economic order quantity (EOQ) - Quantity Discounts - Safety Stock – Replacement Theory - Program Evaluation Review Technique (PERT) and Critical Path Method (CPM) - Simulation Models - Quality Control.							
UNIT - III	FINANCIAL MANAGEMENT						(9)
Working Capital Management - Compound Interest and Present Value methods - Discounted Cash Flow Techniques - Capital Budgeting.							
UNIT - IV	DECISION THEORY						(9)
Decision Theory - Decision Rules - Decision making under conditions of certainty, risk and uncertainty - Decision trees - Utility Theory.							
UNIT - V	MANAGERIAL ECONOMICS						(9)
Cost Concepts - Break-even analysis - Pricing Techniques - Game theory Applications.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Interpret the linear programming and graphical methods	Understand
CO2	Construct on EOQ, simulation models & Quality Control	Apply
CO3	Rephrase the working capital cost and capital budgeting	Understand
CO4	Identify the critical situation by decision theory	Apply
CO5	Relate the cost concepts and pricing techniques	Remember

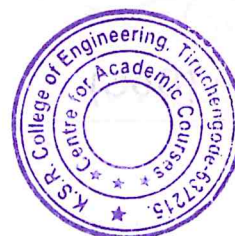
REFERENCES:

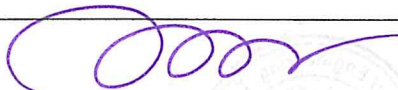
1. Miguel Angel Canela. Ines Alegre and Alberto Ibarra., Quantitative Methods for Management A Practical Approach, Springer International Publishing, New York, First Edition, 2019.
2. Schroeder, R.G., Operations Management, McGraw Hill, New york, 8th Edition, 2020.
3. HamdyTaha., Operations Research: An Introduction, Prentice Hall, New Jersey, 10th Edition, 2019.
4. Louise Swift. and Sally Piff., Quantitative Methods: for Business, Management and Finance, Bloomsbury Publishing, London, 4th Edition, 2014.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E07		AUTOMATION IN CONSTRUCTION INDUSTRY		Category	L	T	P	SL	C
				PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)									
PREREQUISITE									
Basic knowledge of construction principles and automation technologies. Familiarity with building systems and introductory computer applications is recommended. Prior coursework in construction management or industrial automation is helpful.									
OBJECTIVES:									
- To explore the design and impact of Building Management Systems on efficiency. - To solve the construction issues through robotic techniques. - To study the components and functions of HVAC, lighting, electrical, and other systems in building automation - To understand the concepts of Communication and office automation system - To understand the application, selection, and safety considerations of robots for tasks such as cutting, finishing, and painting.									
UNIT - I		INTRODUCTION AND SENSORS						(9)	
Hours Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS- Review and analysis of state- of –art in construction automation -									
UNIT - II		SENSORS AND INSPECTION						(9)	
Field sensors actuators – controllers - non-destructive evaluation - data acquisition - examples of sensors in existing automated equipment.									
UNIT - III		BUILDING AUTOMATION						(9)	
Hours Introduction to building automation systems – components– Heating, ventilation, and air conditioning (HVAC)– Lighting – Electrical systems water supply and sanitary systems– Fire safety – security -Communication and office automation system -Water pump monitoring & control - Control of Computerized HVAC Systems.									
UNIT - IV		ROBOTICS IN CONSTRUCTION						(9)	
Hours Automation and robotic technologies for customized component - module and building prefabrication- Elementary technologies and single – Task construction robots - Site automation robotic on site factories.									
UNIT - V		CONSTRUCTION ROBOTS						(9)	
Hours Selecting robot- Activated concrete cutting robot, concrete floor finishing robot- Ceiling panel positioning robot- Exterior wall painting robot-safety and training- case studies.									
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS									
 Chairman (BoS) 									

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Understand the application of building management system and automation in on and offsite projects	Understand
CO2	Show the sensor inspection and robotic techniques	Understand
CO3	Construct the application of computer in construction Information processing and building automation	Apply
CO4	Understand the concepts of Communication and office automation system	Understand
CO5	Build the application of Robotics in Construction	Apply

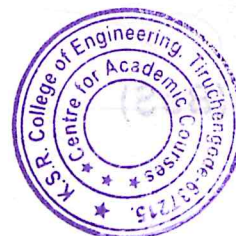
REFERENCES:

1. Ingrid A. N. and F. Richard T., "Building Automation: Control Devices and Applications" Wiley, Hoboken, New Jersey, 2018
2. S. T. Smith and B. N. Wang (Eds.), "Robotics and Automation in Construction" CRC Press, Boca Raton, Florida, 2021
3. Javad Majrouhi Sardroud, Automated Management of Construction Projects, LAP Lambert Academic Publishing, Saarbrücken, 2019
4. Wang Shengwei, Intelligent Buildings and Building Automation, 2nd edition, Taylor & Francis Group, Boca Raton, Florida, 2021

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	3	2	3	2	3
CO3	3	2	3	2	3
CO4	3	2	3	2	3
CO5	3	2	3	2	3
Avg.	3	2	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E08	SUPPLY CHAIN MANAGEMENT	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Basic understanding of business operations, economics, and introductory management concepts is essential, along with proficiency in mathematics and financial principles.							
OBJECTIVES:							
This course provides an overview of supply chain management, covering its fundamentals, historical evolution, and economic impact. It focuses on strategic sourcing decisions, network design, location and capacity planning, and distribution strategies. It also addresses inventory management under uncertainty, along with contemporary trends like integration, partnerships, and the value of information.							
UNIT - I	INTRODUCTION						(9)
Supply Chain - Fundamentals - Evolution - Role in Economy - Importance - Decision Phases - Supplier- Manufacturer-Customer chain. - Enablers/ Drivers of Supply Chain Performance. Supply chain strategy - Supply Chain Performance Measures.							
UNIT - II	STRATEGIC SOURCING						(9)
Outsourcing - Make Vs buy - Identifying core processes - Market Vs Hierarchy - Make Vs buy continuum - Sourcing strategy - Supplier Selection and Contract Negotiation - Creating a world class supply base - Supplier Development - World Wide Sourcing.							
UNIT - III	SUPPLY CHAIN NETWORK						(9)
Distribution Network Design - Role - Factors Influencing Options, Value Addition - Distribution Strategies - Models for Facility Location and Capacity allocation. Distribution Center Location Models - Supply Chain Network optimization models - Impact of uncertainty on Network Design - Network Design decisions using Decision trees.							
UNIT - IV	PLANNING DEMAND, INVENTORY AND SUPPLY						(9)
Managing supply chain cycle inventory - Uncertainty in the supply chain - Analysing impact of supply chain redesign on the inventory - Risk Pooling - Managing inventory for short life - cycle products - Multiple item - Multiple location inventory management - Pricing and Revenue Management							
UNIT - V	CURRENT TRENDS						(9)
Supply Chain Integration - Building partnership and trust in SC Value of Information: Bullwhip Effect - Effective forecasting - Coordinating the supply chain.SC Restructuring - SC Mapping -SC process restructuring, Postpone the point of differentiation - IT in Supply Chain - Agile Supply Chains -Reverse Supply chain - Agro Supply Chains.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Understand the significance of supply chains, decision phases, and the roles of suppliers, manufacturers, and customers.	Understand
CO2	Develop skills in supplier selection, contract negotiation, supplier development, and global sourcing	Apply
CO3	Apply models for facility location, network optimization, and decision trees to address uncertainty in network design.	Apply
CO4	Construct inventory for short-life-cycle products and multiple-item, multiple-location scenarios, and understand pricing and revenue management techniques.	Understand
CO5	Analyze the bullwhip effect, effective forecasting, supply chain coordination, and explore trends like agile and reverse supply chains, agro supply chains, and IT applications in SCM	Analyze

REFERENCES:

1. Janat Shah, "Supply Chain Management – Text and Cases" Pearson Education, 5th Edition, 2012.
2. Sunil Chopra and Peter Meindl, "Supply Chain Management-Strategy Planning and Operation" PHI Learning / Pearson Education, 5th edition, 2012
3. Ballou Ronald H, Business Logistics and Supply Chain Management, Pearson Education, 5th Edition, 2013.
4. Joel D. Wisner, G. Keong Leong, Keah-Choon Tan, Principles of Supply Chain Management A Balanced Approach, South-Western, Cengage Learning, 3rd edition, 2011.

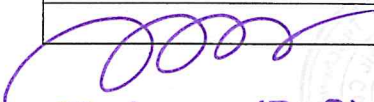
Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	2	3
CO2	3	-	3	2	3
CO3	3	-	3	2	3
CO4	3	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E09	HUMAN RESOURCES MANAGEMENT IN CONSTRUCTION	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Foundational understanding of basic management principles and human resource concepts, along with strong communication skills. Familiarity with organizational behavior and basic psychology is essential. Knowledge of employment laws and effective problem-solving skills will also be beneficial.							
OBJECTIVES: To apply practices for performance evaluation, team structuring, and mentoring- grasp leadership roles, principles, and attitudes- uphold professional and ethical responsibilities ensure quality, timeliness, and continuous improvement and gain a clear understanding of future managerial responsibilities, emphasizing human resource management within a multicultural context.							
UNIT - I	MANPOWER PLANNING					9	
Manpower planning and forecasting - Recruitment, selection process - Sources-Induction Orientation and Training - Manpower Planning process - Organising, Staffing, directing, and controlling - Factors influencing supply and demand of human resources - Role of HR manager - Personnel Principles.							
UNIT - II	ORGANISATION					9	
Elements of an organization - Management process in organizations - Planning-Organizing Staffing - Directing - Controlling - Delegation of authority - Responsibility - Accountability - lines and staff organization Workforce diversity - International dimensions of Organization - Organizational structure - determinants of organizational design.							
UNIT - III	HUMAN RELATIONS AND ORGANISATIONAL BEHAVIOUR					9	
Basic individual psychology - Approaches to job design and job redesign - Self managing work teams - Intergroup - Conflict in organizations - Leadership - Engineer as Manager - aspects of decision making - Significance of human relation and organizational - Individual in organization - Motivation - Personality and creativity - Group dynamics, Team working - Communication and negotiation skills							
UNIT - IV	WELFARE MEASURES					9	
Establishing Pay plans - Basics of compensation-factors determining pay rate - Current trends in compensation - Job evaluation - Incentives-Practices in Indian organizations - Statutory benefits-non-statutory (voluntary) benefits-Insurance benefits - Retirement benefits and other welfare measures to build employee commitment - Laws related to welfare measures.							
UNIT - V	MANAGEMENT AND DEVELOPMENT METHODS					9	
Management Development - On-the-job and off-the-job-Management Developments - Performance appraisal in practice - Managing careers: Career planning and development- Managing promotions and transfers of operations - Developing policies, practices and establishing process pattern - Competency upgradation and their assessment - New methods of training and development - Performance Management.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							



Chairman (BoS)

K.S.R College of Engineering

Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Description	Cognitive Level
CO1	Understand the principles and processes of manpower planning, including forecasting, recruitment, selection, induction, and training	Understand
CO2	Analyze the elements of organizational structure and management processes, focusing on planning, organizing, staffing, directing, and controlling	Analyze
CO3	Examine the individual psychology and its impact on job design, conflict resolution, leadership, and decision-making, while emphasizing the significance of human relations	Analyze
CO4	Evaluate various welfare measures and compensation strategies, including pay plans, job evaluation, statutory and non-statutory benefits	Evaluate
CO5	Understand management development techniques, including on-the-job and off-the-job training, performance appraisal practices, career planning	Understand

REFERENCES:

1. Charles D Pringle, Justin Gooder, Longenecker, Management, CE Merrill Publishing Co. 2001.
2. Dwivedi R.S, Human Relations and Organisational Behaviour, Macmillan India Ltd., 2005.
3. Josy .J, Familaro, "Handbook of Human Resources Administration", McGraw-Hill International Edition, 2007.
4. Carleton Counter II and Jill Justice Coulter, "The Complete Standard Handbook of Construction Personnel Management ", Prentice Hall, Inc., New Jersey, 1989.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E10	RISK AND DUE DILIGENCE	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
A foundational understanding of business principles and financial concepts. Familiarity with basic project management techniques and organizational behavior is essential. Strong analytical and problem-solving skills will also be beneficial for assessing and managing risks effectively.							
OBJECTIVES:							
To understand risk management concepts and frameworks, analyze financial, operational, and project risks, explore due diligence in mergers and acquisitions, identify risk mitigation tools and techniques, and develop skills for conducting comprehensive due diligence to support decision-making.							
UNIT - I	INTRODUCTION TO RISK MANAGEMENT						(9)
Types of risks: Financial, operational, strategic, compliance, reputational - Risk identification techniques and risk management frameworks - Risk assessment, measurement, and control - Enterprise Risk Management (ERM)							
UNIT - II	RISK ANALYSIS AND EVALUATION						(9)
Quantitative and qualitative risk analysis - Risk impact assessment, probability estimation - Risk prioritization: Risk matrices and decision trees - Scenario analysis and stress testing							
UNIT - III	DUE DILIGENCE PROCESS						(9)
Purpose and scope of due diligence in business transactions - Types of due diligence: Financial, legal, operational, environmental - Due diligence in mergers, acquisitions, and joint ventures - Reporting and recommendations based on due diligence findings							
UNIT - IV	RISK MITIGATION STRATEGIES						(9)
Risk response planning: Avoidance, mitigation, transfer, and acceptance - Insurance as a risk management tool - Contractual risk management and negotiation - Business continuity planning and disaster recovery							
UNIT - V	CASE STUDIES IN RISK AND DUE DILIGENCE						(9)
Real-world case studies on risk management failures and successes - Analysis of due diligence processes in high-profile mergers and acquisitions - Lessons learned from corporate risk management strategies							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Understand key concepts and types of risk in business operations.	Understand
CO2	Analyze various risks using qualitative and quantitative methods.	Analyze
CO3	Develop due diligence in business transactions and make informed decisions.	Apply
CO4	Identify risk mitigation strategies for different business scenarios.	Apply
CO5	Evaluate risk management case studies and learn from real-world outcomes.	Evaluate

REFERENCES:

1. Vaughan, E. J., "Risk Management," Wiley, 12th Edition, 2019.
2. Lajoux, A. R., "The Art of M&A Due Diligence: Navigating Critical Steps and Uncovering Crucial Data," McGraw-Hill, 2nd Edition, 2019.
3. Culp, C. L., "The Risk Management Process: Business Strategy and Tactics," Wiley, 1st Edition, 2021.
4. Damodaran, A., "Strategic Risk Taking: A Framework for Risk Management," Pearson, 1st Edition, 2018.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high

CN24E11	GIS IN CONSTRUCTION ENGINEERING AND MANAGEMENT	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE							
Basic understanding of geographic concepts, coordinates systems, and map reading. Familiarity with project management, budgeting, scheduling, and resource allocation. Understanding of basic statistical methods for data analysis and interpretation.							
OBJECTIVES:							
To understand Geographic Information Systems (GIS) and its components, learn about spatial and non-spatial data types, explore raster and vector data storage methods, apply essential GIS analysis techniques such as reclassification, measurement, buffering, and overlay operations, and utilize various methods for GIS output presentation including maps, graphs, charts, plots, and reports.							
UNIT - I	INTRODUCTION TO GIS						(9)
GIS - Definition - Components of GIS - Maps - Definition - Types of Maps - Characteristics of Maps - Map Projections - Hardware, Software and Organizational Context - GIS software							
UNIT - II	TYPES OF DATA						(9)
Data Types - Spatial and Non-Spatial - Spatial Data - Points, Lines and areas - Non spatial data - Nominal, Ordinal, Interval and Ratio - Digitizer - Scanner - Editing and Cleaning - Geo reference data							
UNIT - III	DATA STRUCTURE						(9)
Raster and Vector Data Structure - Raster data storage - Run length, Chain and Block Coding - Vector Data Storage - Topology - Topological Models - Arc Node Structure - Surface Data - DEM - Grid DEM and TIN structure - Applications of DEM							
UNIT - IV	DATA QUALITY						(9)
Reclassification - Measurement - Buffering - Overlaying - SQL for Queries - Neighborhood and zonal operations - Data Quality - Components of data quality - Sources of errors in GIS - Meta data							
UNIT - V	DIFFERENT TYPES OF OUTPUT						(9)
Output - Maps, Graphs, Charts, Plots, Reports - Printers - Plotters - Fields of application - Natural Resource Management, construction management-Parcel based, AM/FM applications examples - Case study.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Identify and describe the core components of GIS, differentiate between various types of maps and their characteristics	Apply
CO2	Apply various types of spatial and non-spatial data, effectively use digitizers and scanners for data collection	Apply
CO3	Distinguish between raster and vector data structures, apply appropriate storage and coding techniques	Analyze
CO4	Identify data quality, identify and address potential sources of errors in GIS	Apply
CO5	Make use of GIS outputs in the form of maps, graphs, charts, plots, and reports using appropriate printers and plotters	Apply

REFERENCES:

1. Anji Reddy, "Remote Sensing and Geographical Information Systems", BS Publications, 4th Edition, 2012.
2. Srinivas M.G., "Remote Sensing Applications", Narosa Publishing House, 1st Edition, 2001.
3. Kali Charan Sahu, "Textbook of Remote Sensing and Geographical Information Systems", Atlantic Publishers and Distributors, 1st Edition, 2024.
4. Mitchell A and Griffin L S, "The Esri Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics", Esri Press, 2nd Edition, 2020.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

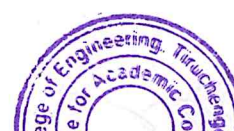
1-low, 2-medium, 3-high


Chairman (BoS)



CN24E12	MODERN STRUCTURAL MATERIALS AND SYSTEM DESIGN	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A course includes a foundational understanding of structural engineering principles and materials science. Familiarity with basic mechanics of materials and structural analysis is essential. Strong analytical skills for assessing material properties and structural behaviors under various loads will also be beneficial							
OBJECTIVES: To explore the properties and classifications of modern structural materials, understand different types of loads on structures, analyze structural systems and load transfer mechanisms, examine the objectives and phases of structural design including high-rise conceptual design, and investigate causes of structural defects along with repair and rehabilitation techniques.							
UNIT - I	MODERN STRUCTURAL MATERIAL					(9)	
Modern structural material: Essential requirements - Properties – Classification - Masonry: Concrete masonry units - Advantages and disadvantages - Sub divisions - Requirements - Types of units - Construction system - Types of structural wall - Structure - Characteristics - Construction type - Behaviour - Failure in flexure and shear. Concrete: Characteristics - Behaviour - compression - Tension. Steel: Types - Grades - Behaviour - Tension. Reinforced concrete: Types of section - Behaviour - cyclic loading - Fiber reinforced concrete: Properties - requirements - factors - benefits – applications - Composite materials: SCS construction - Failure modes - Concept - Behaviour - Applications.							
UNIT - II	LOADS					(9)	
Loads: Static monotonic and cyclic dynamic loads - Dead loads: Materials - Components. Imposed loads: General provisions - categories - Reduction factors - Example. Wind loads: Basics - Pressure - Static and dynamic approach - Along wind - Gust factor method. Earthquake load: General provisions - Assumptions - Base shear - Distribution. Blast loads: Drag & diffraction type - Scaling law - General recommendation - Special loads. (Indian standard codal provisions)							
UNIT - III	STRUCTURAL SYSTEMS					(9)	
Structural systems: Functions - Understanding - Load transfer mechanism - Floor system - types - aspects. Vertical load transfer system: Wall bearings - Column / post. Horizontal load transfer system: Cost of system - Basics of system - Functions - classifications - Rigid frames - Advantages - Behaviour due to external shear and moments - Analysis methods - Braced frames - Types - Behaviour - Methods of analysis							
UNIT - IV	DESIGN CONCEPTS					(9)	
Design Concepts: Objectives - Basic requirements - Phases of construction projects - Process of design - Conceptual design - Steps involved - High rise structures: Need - Benefits – Drawbacks - Common requirements for structures - Other requirements - Design parameters - Stages of design - Elements of structural system - Economy in design.							

UNIT - V	REPAIR AND REHABILITATION					(9)
Repair and Rehabilitation: Introduction - Defects - Repair cost - Distress in structures - Types - Deterioration of structures - Causes for deterioration - Techniques of repair - Cracks - Spalling - Disintegration - Materials for repair - Strengthening techniques of structural distress - Damage evaluation - Assessment procedure - Flow chart - Quality monitoring: Maintenance - Importance - routine Maintenance.						
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS						
COURSE OUTCOMES:						
At the end of the course, the students will be able to:						
COs	Course Outcome					Cognitive Level
CO1	Identify the different modern materials and their behaviour					Apply
CO2	Simplify about the various types of load acting on structures					Analyse
CO3	Explain the various mechanism on load transfer and behaviour					Understand
CO4	Illustrate about the various construction projects and design stages					Understand
CO5	Interpret about the maintenance and rehabilitation of structure					Understand
REFERENCES:						
1. Elias Cueto. and David Gonzalez., An Introduction to Structural Mechanics for Architects, Springer International Publishing, New York, First Edition, 2018.						
2. Bryan Christiansen. and GulsahKoç., Reusable and Sustainable Building Materials in Modern Architecture, IGI Global, Pennsylvania, First Edition, 2018.						
3. Andreas Ochsner. and Holm Altenbach., Mechanical and Materials Engineering of Modern Structure and Component Design, Springer International Publishing, New York, Second Edition, 2016.						
4. Enjel Heinrich., Structures Systems, Iliffe Publishing, London, First Edition, 2007.						
Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
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	
Avg.	3	-	3	2	3	
1-low, 2-medium, 3-high						

CN24E13	PERSONNEL MANAGEMENT IN CONSTRUCTION	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A foundational understanding of basic management principles and human resource management concepts. Familiarity with organizational behavior and communication skills is essential. Additionally, basic knowledge of labor laws and employee rights will be beneficial for effective application of welfare measures and policies.							
OBJECTIVES: To understand manpower planning processes and factors influencing supply and demand, analyze organizational structures and span of control, explore fundamentals of people management including psychology, motivation, and job design, examine welfare measures such as compensation, safety, and health benefits, and evaluate management and development practices related to compensation.							
UNIT - I	MAN POWER PLANNING						(9)
Manpower Planning process, Organizing, Staffing, directing, and controlling - Estimation, manpower requirement - Factors influencing supply and demand of human resources - Role of HR manager – Personnel Principles.							
UNIT - II	ORGANISATION						(9)
Organisation - Span of Control - Organisation Charts - Staffing Plan - Development and Operation of human resources - Managerial Staffing - Recruitment - Selection - Placement, Training and Development							
UNIT - III	HUMAN BEHAVIOUR						(9)
Introduction to the field of people management - basic individual psychology- motivation - Job design and performance management - Managing groups at work - self-managing work teams - intergroup behaviour and conflict in organizations - Leadership - Behavioural aspects of decision-making- and communication for people management							
UNIT - IV	WELFARE MEASURES						(9)
Compensation - Safety and health - GPF - EPF - Group Insurance - Housing - Pension - Laws related to welfare measures.							
UNIT - V	MANAGEMENT AND DEVELOPMENT METHODS						(9)
Compensation - Wages and Salary, Employee Benefits, employee appraisal and assessment - Employee services - Safety and Health - Discipline and discharge - Special Human resource problems, Performance appraisal. - Employee hand book and personnel manual - Job descriptions and organization structure and human relations – Productivity of Human resources							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	List various processes in manpower planning, organizational and welfare measures	Remember
CO2	Identify the development and operation of human resources.	Apply
CO3	Analyze the field of people management and intergroup behaviour and conflict in organizations.	Analyze
CO4	Discover the welfare measures and Laws related to welfare measures.	Analyze
CO5	Illustrate the elements of management and development methods of the employee services.	Understand

REFERENCES:

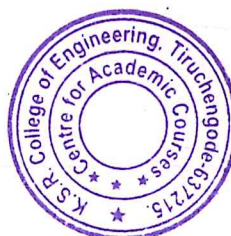
1. Matthias Zeuch., Handbook of Human Resources Administration, Springer, Berlin Heidelberg, First Edition, 2016.
2. Tyagi, A.K., Handbook on Energy Audits and Management, Tata Energy Research Institute, Bangalore, First Edition, 2003.
3. Rao, V.S.P. and Mamoria, C.B., Personnel Management (Text and Cases), Himalaya Publishing House, Bangalore, First Edition, 2019.
4. Dwivedi, R.S., Human Relations and Organisational Behaviour, Macmillian India Ltd., Noida, First Edition, 2008

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
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
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E14	FUNDAMENTALS OF ENTREPRENEURSHIP	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A course include a foundational understanding of business principles and basic economics. Familiarity with marketing concepts and financial literacy is essential for evaluating business opportunities. Additionally, prior exposure to strategic planning and management practices will be beneficial for developing effective business models and plans.							
OBJECTIVES: To provide awareness about entrepreneurship, develop idea generation and innovative skills, motivate students through opportunities and success stories, learn how to start an enterprise and design fundable business plans, and explore various financial sources including banks, non-banking institutions, and venture capital.							
UNIT - I	INTRODUCTION TO ENTREPRENEURSHIP					(9)	
Understanding the Meaning of Entrepreneur - Characteristics and Qualities of an Entrepreneur - Entrepreneurs Vs Intrapreneurs and Managers - Classification of Entrepreneurs - Factors Influencing Entrepreneurship - Entrepreneurial Environment - Entrepreneurial Growth - Problems and Challenges of Entrepreneurs - Entrepreneurial Scenario in India							
UNIT - II	MICRO, SMALL AND MEDIUM ENTERPRISES					(9)	
MSMEs - Definition and Significance in Indian Economy - MSME Schemes, Challenges and Difficulties in availing MSME Schemes, Forms of Business - Women Entrepreneurship - Rural Entrepreneurship - Family Business and First, Generation Entrepreneurs.							
UNIT - III	IDEA GENERATION AND FEASIBILITY ANALYSIS					(9)	
Idea Generation - Creativity and Innovation - Identification of Business Opportunities - Market Entry Strategies - Marketing Feasibility - Financial Feasibilities - Political Feasibilities - Economic Feasibility - Social and Legal Feasibilities - Technical Feasibilities - Managerial Feasibility, Location and Other Utilities Feasibilities.							
UNIT - IV	BUSINESS MODEL AND PLAN IN RESPECTIVE INDUSTRY					(9)	
Business model - Meaning, designing, analyzing and improvising - Business Plan - Meaning, Scope and Need - Financial, Marketing, Human Resource and Production/Service Plan - Business plan Formats.- Project report preparation and presentation - Why some Business Plan fails?							
UNIT - V	FINANCING AND HOW TO START UP BUSINESS?					(9)	
Financial opportunity identification - Banking sources - Non-banking Institutions and Agencies- Venture Capital - Meaning and Role in Entrepreneurship - Government Schemes for funding business- Pre launch, Launch and Post launch requirements - Procedure for getting License and Registration - Challenges and Difficulties in Starting an Enterprise.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Identify the elements and qualities of an entrepreneur.	Apply
CO2	Outline the various schemes available for starting an entrepreneurship	Understand
CO3	Compare various feasibility studies for starting an entrepreneurship	Evaluate
CO4	Examine the various business models and analyze their effectiveness.	Analyze
CO5	Summarize about the financing methods available to start a business	Understand

REFERENCES:

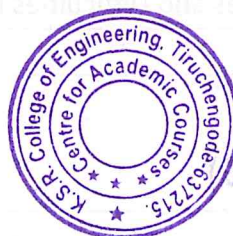
1. Jayshree Suresh, "Entrepreneurial Development", Margham Publishers, Chennai, 2011.
2. Poornima M Charantimath, "Entrepreneurship development small business enterprises", Pearson, 2013.
3. Raj Shankar, "Entrepreneurship: Theory and Practice", Vijay Nicole imprints Ltd in collaboration with Tata Mc-graw Hill Publishing Co.ltd.-New Delhi, 2012
4. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 8th Edition, Tata Mc-graw Hill Publishing Co.ltd.-New Delhi, 2012

Mapping of COs with POs and PSOs

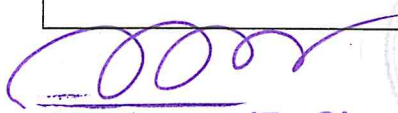
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	2	3
CO2	3	-	3	2	3
CO3	3	-	3	2	3
CO4	3	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E15	ENERGY CONSERVATION TECHNIQUES IN BUILDING CONSTRUCTION AND MAINTENANCE	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: It ensures that students have a well-rounded background to effectively engage with the course material and apply energy conservation techniques in building construction and maintenance. Understanding of fundamental construction concepts and building systems, including structural components, insulation, and materials.							
OBJECTIVES: To assess the effectiveness of solar energy systems and their role in energy conservation, understand the impacts of airborne emissions from building operations and materials, perform economic and life-cycle cost analyses for sustainable projects, consider energy in architectural and engineering design, and develop strategies for efficient facility operation and maintenance.							
UNIT - I	FUNDAMENTALS OF ENERGY						(9)
Fundamentals of Energy - Energy production systems - Heating, Ventilating and Air-conditioning - Solar Energy and conservation - Geothermal energy - Energy economics Analysis - Energy conservation - Domestic energy consumption - Savings - Challenges - Primary energy use in buildings - Residential - Commercial - Institutional and Public buildings.							
UNIT - II	ENERGY AND RESOURCE CONSERVATION						(9)
Energy and resource conservation - Evaluation tools for building energy - Embodied and operating energy - Peak demand - Visual and acoustical quality - Land, water and materials - Airborne emissions and Waste Management.							
UNIT - III	DESIGN CONSIDERATION						(9)
Natural building design consideration - Energy efficient design strategies - Contextual factors - Longevity and process assessment - Renewable energy sources and design - Acoustic Design- Rain Water harvesting -Design of green buildings - Indian Green Building Council and LEED standards - Advanced building technologies - Smart buildings - Economics and cost analysis.							
UNIT - IV	ENERGY IN BUILDING DESIGN						(9)
Energy in building design - Energy efficient and Environment friendly building - Thermal phenomena - climate, sun and solar radiation - Psychometrics - Passive and Active HVAC systems - Preliminary investigations - Goals and policies - Energy audit - Types of Energy Audit - Analysis of results - Energy flow diagram - Energy consumption/Unit production - Identification of wastage - Priority of conservative measures.							
UNIT - V	ENERGY MANAGEMENT						(9)
Energy management of electrical equipment - Improvement of power factor - Management of maximum demand - Energy savings in pumps - Fans - Compressed air systems - Energy savings in lighting systems - Energy management in Facade systems - Air conditioning systems - Applications - Facility operation and maintenance - Facility modifications - Energy recovery dehumidifier - Water heat recovery - Steam plants and distribution systems - Improvement of boiler efficiency - Frequency of blow down - Steam leakage - Steam flash and condense return.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							


Chairman (BoS)
 K.S.R College of Engineering

Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Infer knowledge about the fundamentals of energy and energy production systems pertaining to Residential, Commercial, Institutional and Public Buildings.	Understand
CO2	Relate the potential of building energy efficiency to impact the nation's energy future, especially as it applies to climate change.	Understand
CO3	Summarize about various options and assess the concepts of energy efficient design	Understand
CO4	Construct the strategy and policy recommendations on energy auditing.	Apply
CO5	Recall the energy management of electrical equipment and appliances in buildings.	Remember

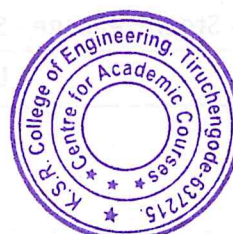
REFERENCES:

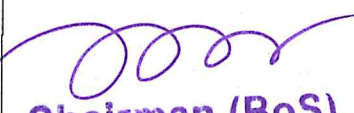
1. LEED 2011 for India for New Construction and Core & Shell Projects, Green Building Rating systems – Detailed reference Guide.
2. Dale Patrick, R. and Stephen Fardo, W., Energy Conservation Guidebook, River Publisher, Denmark, Third Edition, 2014.
3. National Building Code-Part VIII Building Services- Section 4, Acoustics, Sound Insulation and Noise Control- Bureau of Indian Standards, New Delhi, 2005.
4. IS: 2526 – 1963 (reaffirmed 2010), Code of Practice for Acoustical Design of Auditoriums and Conference Hall- Ninth Edition, New Delhi, 1998 (incorporating Amendment No: 1).

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2		3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E16	TALL STRUCTURES	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Students familiarity with the properties and behavior of construction materials, particularly under stress, strain, and environmental factors							
OBJECTIVES: To understand various loading conditions including gravity, wind, and earthquake loads analyze factors affecting building growth, height, and structural form explore modeling techniques for structural analysis and study properties and design considerations of structural elements and examine the stability of tall buildings through buckling analysis.							
UNIT - I	LOADING AND DESIGN PRINCIPLES						(9)
Loading- sequential loading, Gravity loading, Wind loading, Earthquake loading, - Equivalent lateral force, modal analysis - Combination of loading, - Static and Dynamic approach - Analytical and wind tunnel experimental methods - Design philosophy - working stress method, limit state method and plastic design.							
UNIT - II	BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS						(9)
Factors affecting growth, height and structural form - High rise behaviour, Rigid frames, braced frames, In filled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, outrigger - Braced and hybrid mega systems.							
UNIT - III	ANALYSIS AND DESIGN						(9)
Modelling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction - Analysis for member forces, drift and twist - Computerized three-dimensional analysis - Assumptions in 3D analysis - Simplified 2D analysis.							
UNIT - IV	STRUCTURAL ELEMENTS						(9)
Sectional shapes - Properties and resisting capacity, design, deflection, cracking, prestressing, shear flow - Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance.							
UNIT - V	STABILITY OF TALL BUILDINGS						(9)
Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis, Translational, Tensional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS)  							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive level
CO1	Explain the types of loading and other analysis methods.	Understand
CO2	Examine the behaviour of various structural systems such as frames, tubular, cores etc.	Analyze
CO3	Inspect the performance of various load analysis and design in 3D and 2D.	Analyze
CO4	Illustrate the effects of structural elements.	Understand
CO5	Recall the concepts of analysis of stability of tall buildings.	Remember

REFERENCES:

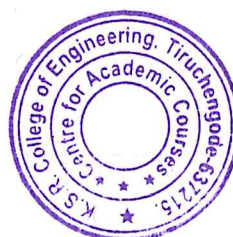
1. Kheir Al-Kodmany., Understanding Tall Buildings A Theory of Place making, Taylor & Francis, London, First Edition, 2017.
2. Bungale Taranath., Structural Analysis and Design of Tall Buildings - Steel and Composite Construction, CRC Press, Oxfordshire, Fourth Edition, 2016..
3. Mark Sarkisian., Designing Tall Buildings Structure as Architecture, Taylor & Francis, London, Second Edition, 2016.
4. Bryan Stafford Smith. and Alexcoull., Tall Building Structures - Analysis and Design, Wiley India Pvt Ltd, New Delhi, Fourth Edition, 2011.

Mapping of COs with POs and PSOs

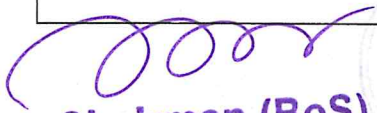
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E17	INFRASTRUCTURE DEVELOPMENT AND BOT, BOOT PROJECTS	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Basic knowledge of contract law and regulations related to public-private partnerships and infrastructure development is crucial for navigating project agreements.							
OBJECTIVES: To understand the concepts, principles, and models of infrastructure development, particularly public-private partnerships (PPPs) such as BOT and BOOT, and to analyze their financial, legal, and risk aspects while evaluating the challenges and opportunities in their implementation.							
UNIT - I	INTRODUCTION TO INFRASTRUCTURE DEVELOPMENT						(9)
Definition and Importance of Infrastructure: Economic growth - social development - Types of Infrastructure: Transport, Energy, Water, Telecommunications, and Urban infrastructure - Infrastructure Development Process: Planning, Design, Construction, Operation, and Maintenance - Role of Government and Private Sector in Infrastructure Development.							
UNIT - II	PUBLIC-PRIVATE PARTNERSHIP (PPP) MODELS						(9)
Introduction to PPP: Concepts, objectives, and advantages, Types of PPP Models: BOT, BOOT, BOO (Build-Own-Operate), BTL (Build-Transfer-Lease), DBFO (Design-Build-Finance-Operate), Legal and Regulatory Framework for PPP Projects: Policies, contracts, and agreements, Case Studies of Successful PPP Projects in Infrastructure Development.							
UNIT - III	BUILD-OPERATE-TRANSFER (BOT) PROJECTS						(9)
Introduction to BOT Projects: Concept, structure, and key features, Financial Structuring of BOT Projects: Sources of finance, revenue models, and financial viability, Risk Management in BOT Projects: Identification, analysis, and mitigation of risks, Case Studies of BOT Projects: Transport, energy, and urban infrastructure projects.							
UNIT - IV	BUILD-OWN-OPERATE-TRANSFER (BOOT) PROJECTS						(9)
Introduction to BOOT Projects: Concept, structure, and key features, Comparison of BOOT with Other PPP Models: Advantages and limitations, Legal and Contractual Aspects of BOOT Projects: Concession agreements, regulatory approvals, Case Studies of BOOT Projects: Energy, water, and transportation infrastructure projects.							
UNIT - V	CHALLENGES AND FUTURE TRENDS IN BOT, BOOT PROJECTS						(9)
Challenges in Implementing BOT and BOOT Projects: Political, financial, technical, and social challenges, Future Trends in Infrastructure Development: Innovations in project finance, sustainable infrastructure, and digital technologies, Impact of Globalization on Infrastructure Development: Cross-border projects and international partnerships, Emerging Opportunities in BOT and BOOT Projects: Renewable energy, smart cities, and urban transport.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							



Chairman (BoS)

K.S.R College of Engineering

Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand the key concepts and importance of infrastructure development	Understand
CO2	Apply PPP models in the planning and execution of infrastructure projects	Apply
CO3	Analyze the financial and risk aspects of BOT projects in infrastructure	Analyze
CO4	Evaluate the legal and contractual frameworks of BOOT projects	Evaluate
CO5	Identify challenges and explore opportunities in BOT and BOOT projects	Apply

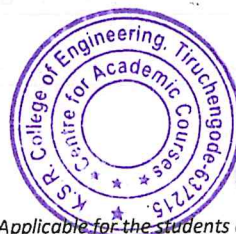
REFERENCES:

- 1 J. Luis Guasch, "Granting and Renegotiating Infrastructure Concessions: Doing it Right," World Bank Publications, 5th Edition, 2021.
- 2 Jeffrey Delmon, "Public-Private Partnership Projects in Infrastructure: An Essential Guide for Policy Makers," Cambridge University Press, 3rd Edition, 2023.
- 3 Prabir De, "Infrastructure Financing: Emerging Perspectives and Approaches," Routledge, 1st Edition, 2022.
- 4 Kumar V. Pratap, "Public-Private Partnerships: The Indian Experience," Springer, 1st Edition, 2022

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E18	URBAN PLANNING AND SUSTAINABILITY	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A foundational understanding of urban geography and spatial planning principles is essential, along with knowledge of environmental science to comprehend the ecological impacts of urbanization. Familiarity with basic economic concepts related to urban development and public policy will aid in analyzing the socio-economic factors influencing city planning							
OBJECTIVES: To enable students to understand project formulation for urban sustainability, theories of urban planning, and the environmental impacts of plans, while equipping them to identify effective methods of infrastructure development and explore opportunities for integrating smart infrastructure and smart city concepts.							
UNIT - I	INTRODUCTION TO CITY PLANNING						(9)
Overview of planning from prehistory to current - Industrialization and the transformation of Urban Space - Detailed case studies of planned cities - Introduction of Remote sensing, GIS and GPS in urban planning. Smart City Planning.							
UNIT - II	ECONOMY AND ENVIRONMENT						(9)
Indian cities and challenges involved in planning - Urban Renewal and Suburbanization - Downtown Redevelopment - Planning for Disaster risk reduction - Energy and Sustainability - Global Sustainability Issues and Climate Change - Concepts of EIA and LCA.							
UNIT - III	PLANNING THEORIES						(9)
Theory of city form: normative models –cosmic, machine, organic- Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory - Modes of planning -Land use and land value -Emerging Concepts and Environmental Planning.							
UNIT - IV	INFRASTRUCTURE PLANNING						(9)
Critical issues in sustainable infrastructural planning- Concepts of basic needs, formation of objectives and standards - Data requirements for planning of urban networks and service - feasibility planning studies for structure, infrastructure systems. Technology for Sustainable Smart City Infrastructure. Recycling Technologies and Renewable energy.							
UNIT - V	SMART CITIES AND SUSTAINABLE DEVELOPMENT						(9)
Human development and sustainability - Rights of future generations -Climate Change and development - Leveraging recent technologies in enhancing urban living: internet of things (IoT) – Concept of smart cities.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Description	Cognitive Level
CO1	Understand the historical evolution of city planning and its relevance in contemporary society.	Understand
CO2	Evaluate urban renewal strategies and their effectiveness in managing suburbanization and downtown redevelopment.	Evaluate
CO3	Inspect emerging concepts in environmental planning and their applicability to modern urban contexts.	Analyze
CO4	Examine technologies for sustainable infrastructure and explore recycling and renewable energy solutions.	Analyze
CO5	Analyze the implications of climate change on urban development and planning strategies.	Analyze

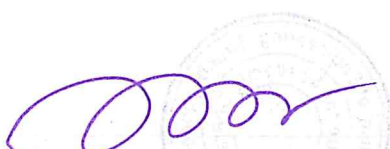
REFERENCES:

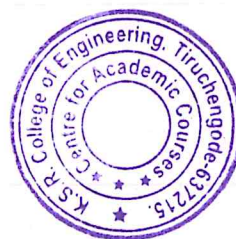
1. Ben C. Harry T. Dimitriou, Ralph Gakenheimer , Urban Transport in the Developing World, A Handbook of Policy and Practice. Edward Elger Publishing, ,2011
2. Joy Sen (2013), Sustainable Urban Planning, The Energy and Resources Institute (TERI), New Delhi, 2013.
3. Carol L. Stimmel, Building Smart Cities: Analytics, ICT, and Design Thinking, An Auerbach Book, CRC Press, 2015.
4. Randall Crane and Rachel Weber, The Oxford Handbook of Urban Planning, Oxford University Press, 2015.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E19		VALUE ENGINEERING IN CONSTRUCTION	Category	L	T	P	SL	C
			PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)								
PREREQUISITE: Having a grasp of these foundational areas would help students or professionals better understand the concepts covered in the value engineering and valuation syllabus.								
OBJECTIVES: To provide students with a comprehensive understanding of Value Engineering and Valuation, enabling them to apply cost optimization, value analysis, and life cycle costing in construction projects. The course trains students in asset valuation across diverse domains and equips them to prepare standardized valuation reports, supported by real-world case studies for practical insight.								
UNIT - I	VALUE ENGINEERING						(9)	
Value Engineering - Definition-Importance to Contractors - Potential VE Applications - Value - basic and secondary functions - Factor contributing to value such as aesthetic - Ergonomic-technical economic - Identifying reasons or unnecessary costs - Different methods of performing value engineering - Methodology								
UNIT - II	APPLICATION OF VALUE ENGINEERING						(9)	
VE during the Planning Phase of a Construction Project - VE during the Design Phase of a Construction Project - VE during the Construction Phase of a Construction Project								
UNIT - III	VALUATION						(9)	
Types of value - Purposes of valuation factors affecting value - Different methods of valuation for different types of assets such as land and building - Horticulture - Historical places								
UNIT - IV	VALUATION REPORT						(9)	
Valuation Report - Contents - Standard formats - Case study of any one Report								
UNIT - V	VALUE ANALYSIS & LIFE CYCLE COSTING						(9)	
10 Commandments of value analysis - Value analysis team- Principles - Elements of job plan Forecasting of Capital as well as operating & maintenance costs - Time value - Present worth analysis-DCF methods - ROR analysis - Sensitivity analysis								
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS								


Chairman (BoS)





COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand value engineering methods and its methodology	Understand
CO2	Apply it to various stages of a construction project	Apply
CO3	Construct valuation for different types of assets	Apply
CO4	Develop report on valuation	Create
CO5	Explain life cycle cost analysis of projects	Evaluate

REFERENCES:

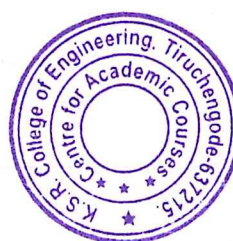
1. Lawrence D. Miles, Techniques of Value Analysis and Engineering, Lawrence D. Miles Value Foundation, 3rd Edition, 2015.
2. B.S. Dhillon, Life Cycle Costing for Engineers, CRC Press Inc- 1st edition, 2009.
3. John Kelly, Steven Male, & Drummond Graham, Value Management of Construction Projects, Wiley-Blackwell, 2nd edition, 2014.
4. Richard Hayward, Valuation: Principles into Practice, Estates Gazette- 6th edition, 2015.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

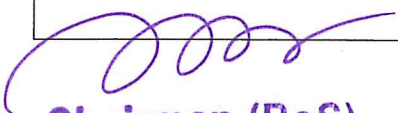
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS)



CN24E20	BUILDING ACOUSTICS AND NOISE CONTROL	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE							
Familiarity with concepts such as frequency, wavelength, and sound pressure is essential for grasping the basics of acoustics. Additionally, knowledge of human physiology related to hearing, including the effects of noise on health, will enhance understanding of the physiological aspects of sound.							
OBJECTIVES:							
To understand the fundamentals of sound propagation and measurement, analyze room acoustics, assess noise impacts on health using relevant standards, utilize sound measurement tools, and apply effective noise control methods, including active noise control techniques.							
UNIT - I	INTRODUCTION TO ACOUSTICS BASICS OF ACOUSTICS						(9)
Speed of sound - Wavelength - Frequency - Wave number - Acoustic pressure and particle velocity - Acoustic intensity and acoustic energy density - Spherical wave - Directivity factor and directivity index - Levels and the decibel - Combination of sound sources - Octave bands - weighted sound levels - Propagation - Plane and spherical waves - Near and far field - Free and reverberant field - Anechoic and Reverberant chambers							
UNIT - II	ACOUSTICS EVALUATION TECHNIQUES						(9)
Room Acoustics - Reverberation time - Absorption and Absorption Coefficient - Evaluation techniques - Acoustic materials							
UNIT - III	NOISE AND PHYSIOLOGICAL EFFECTS						(9)
Acoustic criteria - The human ear - Hearing loss - Industrial noise criteria - Speech interference level - Noise criteria for interior spaces loudness - Hearing - Hearing loss - Hearing protectors - Mechanism - Weighted Networks - Noise standards for traffic - Community noise - Aircraft - Environmental noise - Machinery acoustics							
UNIT - IV	SOUND LEVEL AND INTENSITY METERS						(9)
Octave analyzers - Octave band filters - Acoustic analyzers - Dosimeter - Measurement of sound power - Sound power measurement in a reverberant room - Sound power measurement in an anechoic chamber - Sound power survey measurements - Measurement of the directivity factor - calibration							
UNIT - V	NOISE CONTROL						(9)
At source and transmission path - Barriers and Enclosures - HVAC system noise - 10 55 Machinery acoustics and levels - Near field monitoring and diagnostics - Active noise control techniques - Noise control in rooms							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							


Chairman (BoS)
 K.S.R College of Engineering

Applicable for the students admitted from 2024-2025 onwards

COURSE OUTCOMES:**At the end of the course- the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Outline appropriate noise control techniques for the solution of practical noise problems and evaluate their performance	Understand
CO2	Analyze room acoustics and apply materials to improve sound quality.	Analyze
CO3	Understand and manage noise effects on health and apply standards to control noise in various environments.	Understand
CO4	Analyze complex noise environments and predict sound levels in desired locations	Analyze
CO5	Evaluate acoustic enclosures- barriers and walls for effective noise control and to become familiar with sound measurement instrumentation	Evaluate

REFERENCES:

1. J.D. Irwin and E.R. Graf-" Industrial Noise and Vibration control" Prentice Hall Inc.2001.
2. Bies and Colin. H. Hanson- "Engg. Noise Control-" E&FN SPON- 2001.
3. Noise Control Hand Book of Principles and Practices- David M. Lipsdomls Van Nostrand Reinhold Company.
4. Acoustic and Noise Control- B.J. Smith- R.J. Peters- Stephanie Owen- ISBN-13: 978-0273724681- Third edition

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low- 2-medium- 3-high



Chairman (BoS)

CN24E21	PREFABRICATED STRUCTURES	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Students should have fundamental knowledge of structural engineering concepts, concrete technology, and basic building construction methods to understand prefabricated systems.							
OBJECTIVES: To impart knowledge on the design, detailing, production, and performance of prefabricated structural elements and their applications in modern construction, with emphasis on planning, analysis, erection, and codal provisions.							
UNIT - I	INTRODUCTION TO ACOUSTICS BASICS OF ACOUSTICS						(9)
General Civil Engineering Requirements, Specific Requirements for Planning and Layout of Prefabricates Plant. IS Code Specification, Modular Co-ordination, Standardization, Disuniting of Prefabricates, Production, Transportation, Erection, Stages of Loading and Codal Provisions, Safety Factors, Material Properties, Deflection Control, Lateral Load Resistance.							
UNIT - II	PREFABRICATED ELEMENTS						(9)
Prefabricated Structures - Long Wall and Cross-Wall Large Panel Buildings, One Way and Two-Way Prefabricated Slabs, Framed Buildings with Partial and Curtain Walls - Connections – Beam to Column and Column to Column.							
UNIT - III	FLOORS, STAIRS AND ROOFS						(9)
Types of Floor Slabs, Analysis and Design Example of Cored and Panel Types and Two-Way Systems, Staircase Slab Design, Types of Roof Slabs and Insulation Requirements, Description of Joints, their Behaviour and Reinforcement Requirements, Deflection Control for Short Term and Long-Term Loads, Ultimate Strength Calculations in Shear and Flexure.							
UNIT - IV	WALLS & JOINTS						(9)
Types of Wall Panels, Blocks and Large Panels, Curtain, Partition and Load Bearing Walls, Load Transfer from Floor to Wall Panels, Vertical Loads, Eccentricity and Stability of Wall Panels, Design Curves, Types of Wall Joints, Their Behavior and Design, Leak Prevention, Joint Sealants, Location and Types of Shear Walls Sandwich Wall Panels, Approximate Design of Shear Walls.							
UNIT - V	INDUSTRIAL BUILDINGS AND SHELL ROOFS						(9)
Components of Single- Storey Industrial Sheds with Crane Gantry Systems, R.C. Roof Trusses, Roof Panels, Corbels and Columns, Wind Bracing Design. Cylindrical, Folded Plate, Hyper-Prefabricated Shells, Erection and Jointing, Joint Design, ACI Hand Book Based Design.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS)  							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Interpret the design principle of prefabricated members	Evaluate
CO2	Develop the different types of elements in prefabrications	Create
CO3	Design the concept of prefabricated members	Create
CO4	Identify the load transfer in different wall panels and joints	Apply
CO5	Construct the components of industrial buildings and roofs members.	Apply

REFERENCES:

1. J. Hubert Bachmann. and Alfred Steinle., Precast Concrete Structures, Ernst & Sohn, New jersey, Second Edition, 2019
2. Wai Kwong Lau., Building Construction with Precast Concrete Structural Elements, Lap Lambert Academic Publishing, Sunnyvale, First Edition, 2010
3. Jolly Colin Elliott. and Kim, S., Multi-Storey Precast Concrete Framed Structures, Wiley Publishers, Washington, Second Edition, 2013.
4. Ganesan, R. and Latha, A., Prefabricated Structures, Sree Kamalamani Publications, Chennai, First Edition, 2014.

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E22	COMPUTER APPLICATION IN CONSTRUCTION ENGINEERING AND PLANNING	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE Students should have fundamental knowledge of Construction Management, Project Planning, and Operations Research.							
OBJECTIVES: To equip students with knowledge of IT applications, optimization techniques, inventory models, and scheduling tools for effective construction project planning, control, and management using modern software solutions.							
UNIT - I	INTRODUCTION						(9)
Overview of IT Applications in Construction – Construction Process – Computerization in Construction – Computer Aided Cost Estimation – Application with Database Software. BIM for Construction Engineering.							
UNIT - II	OPTIMIZATION TECHNIQUES						(9)
Linear, Dynamic and Integer Programming – Branch and Bound Techniques – Application to Production Scheduling, Equipment Material Transportation and Work Assignment Problems – Software applications.							
UNIT - III	INVENTORY MODELS						(9)
Deterministic and Probabilistic Inventory Models – Software applications.							
UNIT - IV	SCHEDULING APPLICATION						(9)
PERT and CPM – Advanced planning and scheduling concepts – Computer applications – Case study							
UNIT - V	OTHER PROBLEMS						(9)
Sequencing problems – Simulation – Enterprises – Introduction to ERP systems.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS)  							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Obtain awareness about the computer applications in construction.	Remember
CO2	Apply the different optimization techniques.	Apply
CO3	Develop inventory models through software applications.	Create
CO4	Solve scheduling problems by computer applications.	Apply
CO5	Educate about simulation and ERP systems.	Understand

REFERENCES:

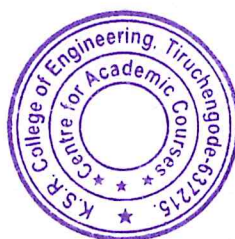
1. Paulson, B.R., Computer Applications in Construction, McGraw Hill, New York, Sixth Edition, 2013
2. Billy E, Gillet., Introduction to Operations Research A Computer Oriented Algorithmic Approach, McGraw Hill, New York, First Edition, 2007
3. Feigenbaum, L., Construction Scheduling with Primavera Project Planner, Prentice Hall Inc, New Jersey ,Second Edition , 2001
4. <https://nptel.ac.in/courses/105/108/105108127/>

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E23	QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE							
The students should have Basic knowledge of Construction Practices, Project Management, and Building Materials.							
OBJECTIVES:							
To provide students with an understanding of quality management systems, planning, assurance, control, and improvement techniques in construction, ensuring reliability, sustainability, and customer satisfaction.							
UNIT - I	QUALITY MANAGEMENT						(9)
Introduction – Definitions and Objectives – Factor Influencing Construction Quality - Responsibilities and Authority - Quality Plan - Quality Management Guidelines – Quality Circles							
UNIT - II	QUALITY SYSTEMS						(9)
Introduction - Quality System Standard – ISO 9000 Family of Standards – Requirements – Preparing Quality System Documents – Quality Related Training – Implementing a Quality System – Third Party Certification							
UNIT - III	QUALITY PLANNING						(9)
Quality Policy, Objectives and Methods in Construction Industry - Consumers Satisfaction, Ergonomics - Time of Completion - Statistical Tolerance – Taguchi’s Concept of Quality – Codes and Standards – Documents – Contract and Construction Programming – Inspection Procedures - Processes and Products – Total QA / QC Programme and Cost Implication							
UNIT - IV	QUALITY ASSURANCE AND CONTROL						(9)
Objectives - Regularity Agent, Owner, Design, Contract and Construction Oriented Objectives, Methods - Techniques and Needs of QA/QC - Different Aspects of Quality - Appraisals, Factors Influencing Construction Quality - Critical, Major Failure Aspects and Failure Mode Analysis, -Stability Methods and Tools, Optimum Design - Reliability Testing, Reliability Coefficient and Reliability Prediction							
UNIT - V	QUALITY IMPROVEMENT TECHNIQUES						(9)
Selection of New Materials - Influence of Drawings, Detailing, Specification, Standardization - Bid Preparation - Construction Activity, Environmental Safety, Social and Environmental Factors - Natural Causes and Speed of Construction - Life Cycle Costing - Value Engineering and Value Analysis							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS)  							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

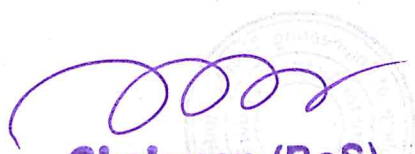
COs	Course Outcome	Cognitive Level
CO1	Describe the principles of Quality management	Understand
CO2	Implement the basic in quality management system.	Apply
CO3	Suggest the feasibility in planning in quality procedures.	Apply
CO4	Recognize the quality assuring and control systems.	Understand
CO5	Appreciate the quality techniques to be followed in improving the construction field.	Understand

REFERENCES:

1. James Brien, J.o., Construction Inspection Handbook – Quality Assurance and Quality Control, Van Nostrand, New York, Third Edition, 2013.
2. Steven McCabe., Quality Improvement Techniques in Construction, Taylor & Francis, New York, Third Edition, 2014.
3. Ashford, J.L., The Management of Quality in Construction, CRC Press, Taylor & Francis Group, Oxfordshire ,Fourth Edition, 2020.
4. Clarkson Oglesby, H., Productivity Improvement in Construction, McGraw-Hill, New York, First Edition, 1989.

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E24	RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE							
Students should possess basic knowledge of construction planning, scheduling, and cost estimation, along with fundamentals of project management and building construction practices..							
OBJECTIVES:							
To enable students to plan, allocate, and manage resources such as manpower, materials, equipment, time, and cost effectively for successful execution of construction projects.							
UNIT - I	RESOURCE PLANNING						(9)
Resource Planning, Procurement, Identification, Personnel, Planning for Material, Labour, Time Schedule and Cost Control, Types of Resources, Manpower, Equipment, Material, Money, Time							
UNIT - II	LABOUR MANAGEMENT						(9)
Systems Approach, Characteristics of Resources, Utilization, Measurement of Actual resources required, Tools for Measurement of Resources, Labour, Classes of Labour, Cost of Labour, Labour Schedule, and Optimum Use of Labour.							
UNIT - III	MATERIALS AND EQUIPMENT						(9)
Material: Time of Purchase, Quantity of Material, Sources, Transportation, Delivery and Distribution Equipment: Planning and Selection by Optimistic Choice with Respect to Cost, Time, Source and Handling.							
UNIT - IV	TIME MANAGEMENT						(9)
Personnel Time, Management and Planning, Managing Time on the Project, Forecasting the Future, Critical Path Measuring the Changes and their Effects-Cash Flow and Cost Control.							
UNIT - V	RESOURCE ALLOCATION AND LEVELLING						(9)
Time - Cost Trade off, Computer Application -Resource Leveling, Resource List, Resource Allocation, Resource Loading, Cumulative Cost - Value Management.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

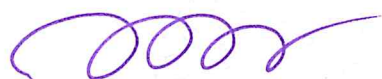
COs	Course Outcome	Cognitive Level
CO1	Identify the resources needed for a construction project	Understand
CO2	Apply the resource based on the requirement	Apply
CO3	Relate the factors that have an effective control over time and cost	Understand
CO4	Suggest a suitable equipment for a construction activity	Apply
CO5	Implement value management concepts in construction projects	Apply

REFERENCES:

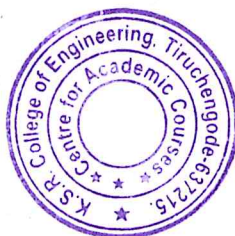
1. Keoki Sears, S. Glenn Sears, A. Richard Clough, H. Jerald Rounds, L. and Robert Segner, O., Construction Project Management, Boston, Fifth Edition, 2015.
2. Chitkara, K.K., Construction Project Management Planning, Scheduling and Controlling, Tata McGraw-Hill Education, New Delhi, First Edition, 2014.
3. Andrew Whyte., Integrated Design and Cost Management for Civil Engineers, CRC Press, Florida, First Edition, 2014
4. <https://nptel.ac.in/courses/105104161/5>

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high



Chairman (BoS)



CN24E25	SHORING, SCAFFOLDING AND FORMWORK	Category	L	T	P	SL	C
		PEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE:							
Students should have basic knowledge of concrete technology, structural design, and construction practices to understand the planning, design, and execution of shoring, scaffolding, and formwork systems.							
OBJECTIVES:							
To provide students with knowledge on the planning, design, materials, erection, and safety aspects of formwork, shoring, scaffolding, and slipform systems used in modern concrete construction.							
UNIT - I	PLANNING, SITE EQUIPMENT & PLANT FOR FORM WORK						(9)
Introduction - Forms for foundations, columns, beams walls etc., General objectives of formwork building - Planning for safety - Development of a Basic System - Key Areas of cost reduction - Planning examples. Overall Planning - Detailed planning - Standard units - Corner units - Pass units - Calculation of labour constants - Formwork hours - Labour Requirement - Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan - Transporting plant - Formwork beams - Scaffold frames - Framed panel formwork - Formwork accessories.							
UNIT - II	MATERIALS ACCESSORIES PROPRIETARY PRODUCTS & PRESSURES						(9)
Lumber - Types - Finish - Sheathing boards working stresses - Repetitive member stress - Plywood - Types and grades - Jointing Boarding - Textured surfaces and strength - Reconstituted wood - Steel - Aluminium - Hardware and fasteners - Nails in Plywood - Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Vertical loads for design of slab forms - Uplift on shores - Laterals loads on slabs and walls.							
UNIT - III	DESIGN OF FORMS AND SHORES						(9)
Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms - Examples in each. Simple wood stresses - Slenderness ratio - Allowable load vs. length behaviour of wood shores - Form lining Design Tables for Wall formwork - Slab Formwork - Column Formwork - Slab props - Stacking Towers - Free standing and restrained - Rosett Shoring - Shoring Tower - Heavy Duty props.							
UNIT - IV	BUILDING AND ERECTING THE FORM WORK						(9)
Carpentry Shop and job mill - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Slab form systems - Sky deck and Multiflex - Customized slab table - Standard Table module forms - Swivel head and uniportal head - Assembly sequence - Cycling with lifting fork - Moving with table trolley and table prop. Various causes of failures – ACI - Design deficiencies - Permitted and gradual irregularities							
UNIT - V	FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SCAFFOLDS						(9)
Hemispherical, Parabolic, Translational shells - Typical barrel vaults Folded plate roof details - Forms for Thin Shell roof slabs design considerations - Building the forms - Placing concrete - Form removed -Strength requirements -Tunnel forming components - Curb forms invert forms - Arch forms - Concrete placement methods - Cut and cover construction - Bulk head method - Pressures on tunnels - Continuous Advancing Slope method - Form construction - Shafts. Slip Forms - Principles -Types - advantages - Functions of various components - Planning -Desirable characteristics of concrete - Common problems faced - Safety in slip forms special structures built with slip form Technique - Types of scaffolds - Putlog and independent scaffold -Single pole scaffolds - Truss suspended - Gantry and system scaffolds.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Explain basic concepts and ideas related with detailed planning of framework	Understand
CO2	Classify the materials accessories proprietary products and its pressures.	Understand
CO3	Make out the comprehensive design aspects of forms and shores	Create
CO4	Identify the complete techniques and standards used in erecting the form work	Apply
CO5	Explain the entire system of forms for domes and tunnels, slip forms and scaffolds.	Understand

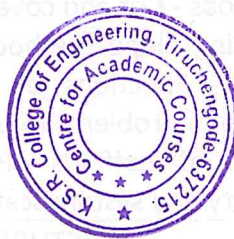
REFERENCES:

1. Kumar Neeraj Jha., Formwork for Concrete Structures, McGraw Hill Education, New York, First Edition, 2017
2. Robert Peurifoy, L. and Garold Oberlender, D., Formwork for Concrete Structures, McGraw - Hill, New York, Fourth Edition 2018.
3. Hurd, M.K., Formwork for Concrete, American Concrete Institute, Detroit, Fourth Edition, 2006.
4. <https://nptel.ac.in/courses/105/104/105104030/>

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high

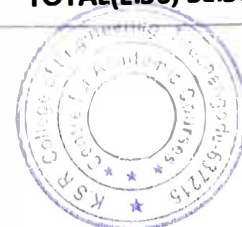

Chairman (BoS)



AUDIT COURSES

AX24A01	DISASTER MANAGEMENT	Category	L	T	P	SL	C
		AC	30	0	0	30	0
(Common to All Branches)							
PREREQUISITE: A basic understanding of geography, environmental science, and public health is a prerequisite for studying disaster management.							
OBJECTIVES: To enable students to understand the nature, causes, and impacts of natural and manmade disasters, identify disaster prone areas with special reference to India, and develop knowledge on disaster preparedness, management strategies, risk assessment techniques, and sustainable approaches for effective disaster mitigation and community resilience.							
UNIT - I	INTRODUCTION						(6)
Disaster: Definition, Factors and Significance, Difference between Hazard and Disaster, Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.							
UNIT - II	REPERCUSSIONS OF DISASTERS AND HAZARDS						(6)
Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.							
UNIT - III	DISASTER PRONE AREAS IN INDIA						(6)
Study of Seismic Zones, Areas Prone to Floods and Droughts, Landslides and Avalanches, Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami, Post-Disaster Diseases and Epidemics							
UNIT - IV	DISASTER PREPAREDNESS AND MANAGEMENT						(6)
Preparedness-Monitoring of Phenomena Triggering a Disaster or Hazard, Evaluation of Risk-Application of Remote Sensing, Data from Meteorological and other agencies, Media Reports - Governmental and Community Preparedness.							
UNIT - V	RISK ASSESSMENT						(6)
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Green economy, Blue economy, Global Co-operation in Risk Assessment and Warning, People's Participation in Risk Assessment, Strategies for Survival.							
TOTAL(L:30, SL:30): 60 PERIODS							

Chairman (BoS)



COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand the definitions, differences, and classifications of disasters and hazards	Understand
CO2	Discuss the destruction of ecosystems and the loss of human and animal life resulting from different disaster events.	Understand
CO3	Compare the vulnerability of different regions in India to various natural disasters.	Understand
CO4	Summarize the methods and technologies used in assessing and monitoring disaster risks.	Understand
CO5	Describe the concept, elements, and current global and national scenarios of disaster risk.	Understand

TEXT BOOKS:

1. Gupta, Harsh K., "Disaster Management", Universities Press, Hyderabad, 2nd Edition, 2013.
2. Satendra, "Disaster Management in India: Perspectives, Issues and Strategies", National Institute of Disaster Management, New Delhi, 1st Edition, 2018.

REFERENCES:

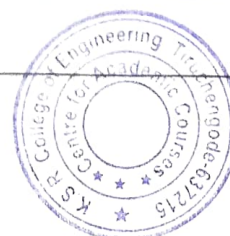
1. Goel S. L., "Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.
2. Nishitha Rai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies" New Royal book Company, 2007.
3. Sahni, Pardeep et.al., "Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi, 2001.
4. Sharma, R.K. and Sharma, G. "Natural Disaster Management: Causes, Effects and Mitigation", Deep & Deep Publications, New Delhi, 2005.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	1	2	1	1
CO2	2	1	2	2	1
CO3	2	1	2	2	2
CO4	2	1	2	2	2
CO5	2	1	2	1	2
Avg.	2	1	2	2	2

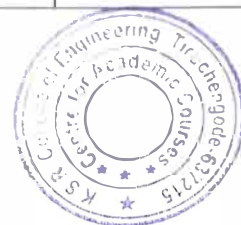
1-low, 2-medium, 3-high

Chairman (BoS)



AX24A02	VALUE EDUCATION	Category	L	T	P	SL	C
		AC	30	0	0	30	0
(Common to All Branches)							
PREREQUISITE:							
Basic understanding of moral principles, social responsibilities, and a willingness to engage in self-reflection and personal growth.							
OBJECTIVE:							
To foster self-development, strengthen human values, and promote overall personality growth and social empowerment through value-based education.							
UNIT - I	INTRODUCTION TO VALUE EDUCATION						(6)
Values and self-development – Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non-moral valuation, Standards and principles, Value judgements.							
UNIT - II	IMPORTANCE OF VALUES						(6)
Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness. Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline.							
UNIT - III	INFLUENCE OF VALUE EDUCATION						(6)
Personality and Behaviour development – Soul and Scientific attitude. Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship Happiness Vs suffering, love for truth.							
UNIT - IV	REINCARNATION THROUGH VALUE EDUCATION						(6)
Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature Character and Competence – Holy books Vs Blind faith, Self-management and Good health, Science of reincarnation.							
UNIT - V	VALUE EDUCATION IN SOCIAL EMPOWERMENT						(6)
Equality, Nonviolence, Humility, Role of Women, all religions and same message, mind your Mind, Self-control, Honesty, Studying effectively.							
TOTAL(L:30,SL:30): 60 PERIODS							
COURSE OUTCOMES:							
At the end of the course, the students will be able to:							
COs	Course Outcome						Cognitive Level
CO1	Gain knowledge of self-development						Understand
CO2	Learn the importance of Human values						Understand
CO3	Develop the overall personality through value education						Understand
CO4	Overcome the self-destructive habits with value education						Understand
CO5	Interpret social empowerment with value education						Understand


Chairman (BoS)



TEXT BOOKS:

1. Chakravarthy, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi, 1999.
2. Chitakra, M.G. "Education and Human Values", A.P.H. Publishing Corporation, New Delhi, 2003.

REFERENCES:

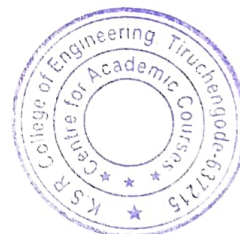
1. Satchidananda, M.K, "Ethics, Education, Indian Unity and Culture", Ajantha Publications, Delhi, 1991.
2. Das, M.S., Gupta, V.K. "Social Values among Young adults: A changing Scenario", M.D. Publications, New Delhi, 1995.
3. Bandiste, D.D., "Humanist Values: A Source Book", B.R. Publishing Corporation, Delhi, 1999.
4. Ruhela, S.P., "Human Values and education", Sterling Publications, New Delhi, 1986.

Mapping of COs with POs and PSOs

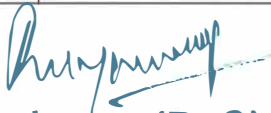
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	1	2	-	2
CO2	1	2	1	-	1
CO3	2	2	2	-	2
CO4	2	1	1	-	1
CO5	1	2	2	-	2

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



AX24A03	CONSTITUTION OF INDIA	Category	L	T	P	SL	C
		AC	30	0	0	30	0
(Common to All Branches)							
PREREQUISITE: Basic awareness of Indian history, civics, and political system at the school level, along with an Interest in understanding the democratic framework and governance of India.							
OBJECTIVE: To provide a comprehensive understanding of the India Constitution, including its basic structure, fundamental rights and duties, directive principles, the functioning of the Union and State governments, and the electoral system.							
UNIT - I	INTRODUCTION TO INDIAN CONSTITUTION						(6)
Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.							
UNIT - II	FUNDAMENTAL RIGHTS AND DUTIES						(6)
Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.							
UNIT - III	UNION GOVERNMENT						(6)
Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament – LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.							
UNIT - IV	STATE GOVERNMENT						(6)
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.							
UNIT - V	ELECTION COMMISSION						(6)
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners – Institute and Bodies for the welfare of SC/ST/OBC and women.							
TOTAL(L:30,SL:30): 60 PERIODS							
COURSE OUTCOMES: At the end of the course, the students will be able to:							
COs	Course Outcome						Cognitive Level
CO1	Understand the basic structure of Indian Constitution.						Understand
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.						Understand
CO3	Know about our Union Government, political structure & codes, procedures.						Understand
CO4	Understand our State Executive of India.						Understand
CO5	Understand our Elections system of India.						Understand


Chairman (BoS)



TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Lexis Nexis Publisher, New Delhi, Twenty-Three Edition, 2018.
2. P.M. Bakshi, "The Constitution of India", Universal law Publishing, New Delhi, Fifteenth Edition, 2018.

REFERENCES:

1. Brij Kishore sharma, "Introduction to the Constitution India", PHI Learning Pvt. Ltd, New Delhi, Seventh Edition, 2015.
2. M. Laxmikanth, "Indian Polity", Tata McGraw Hill, New Delhi, Sixth Edition, 2017.
3. P. K. Agarwal, "Constitution of India", Prabhat Publishers, New Delhi, Second Edition, 2015. M.P. Jain, "Indian Constitution Law", Lexis Nexis Publisher, New Delhi, Seventh Edition, 2014.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	1	2	1	-	2
CO2	2	2	1	-	2
CO3	2	2	1	-	2
CO4	1	2	1	-	1
CO5	1	2	1	-	2

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



AX24A04	INDIAN KNOWLEDGE SYSTEM	Category	L	T	P	SL	C
		AC	30	0	0	30	0

(Common to All Branches)

PREREQUISITE:

Basic knowledge of Indian history and culture, and an interest in exploring traditional systems of knowledge across disciplines such as science, technology, humanities, and philosophy.

OBJECTIVE:

- To provide an understanding of the historical evolution, key features, and multidisciplinary applications of the Indian Knowledge System, encompassing its contributions to humanities, science, engineering, socio-religious practices, and the need for its protection and preservation.

UNIT - I	INTRODUCTION TO INDIAN KNOWLEDGE SYSTEM	(6)
-----------------	--	------------

Importance of Ancient Knowledge System, Definition, concept, and scope of Indian Knowledge System (IKS), IKS based approaches on knowledge paradigms, IKS in modern India, Some unique Aspects of IKS.

UNIT - II	TRADITIONAL KNOWLEDGE IN HUMANITIES AND SCIENCES	(6)
------------------	---	------------

Linguistics, Number and measurements - Mathematics, Chemistry, Physics, Art, Astronomy, Astrology, Crafts and Trade in India and Engineering and Technology.

UNIT - III	TRADITIONAL KNOWLEDGE IN PROFESSIONAL DOMAIN	(6)
-------------------	---	------------

Town planning and architecture Construction, Health, wellness and Psychology – Medicine, Agriculture, Governance and public administration, United Nations Sustainable development goals.

UNIT - IV	APPLIED TRADITIONAL KNOWLEDGE	(6)
------------------	--------------------------------------	------------

Myths, Rituals, Spirituals, Taboos and Belief System, Folk Stories, Songs, Proverbs, Dance, Play, Acts and Traditional Narratives, Agriculture, animal husbandry, Forest, Sacred Groves, Water Mills, Sacred Water Bodies, Land, water and Soil Conservation and management Practices, Indigenous Bio-resource Conservation, Utilization Practices and Food Preservation Methods, Handicrafts, Wood Processing and Carving-Fiber Extraction and Costumes

UNIT - V	PROTECTION OF INDIAN KNOWLEDGE SYSTEM	(6)
-----------------	--	------------

Documentation and Preservation of IKS, approaches for conservation and Management of nature and bio-resources, Approaches and strategies to protection and conservation of IKS.

LECTURE: 30,SL:30, TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Explain the historicity of Indian Knowledge System.	Understand
CO2	Explain the features of traditional knowledge in humanities and sciences.	Understand
CO3	Develop familiarity with science, engineering and technology of IKS.	Understand
CO4	Understand the importance of functional, aesthetic, and socio-religious concept of IKS.	Understand
CO5	Understand the concepts of protection of IKS.	Understand


Chairman (BoS)



TEXT BOOKS:

1. B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N, "Introduction to Indian Knowledge System Concepts and Applications", PHI Learning Private Ltd, 2022, ISBN-978-93-91818-21-0.
2. Amit Jha, "Traditional Knowledge System in India", Atlantic Publishers and Distributors (P) Ltd., 2009, ISBN-13: 978-8126912230

REFERENCES:

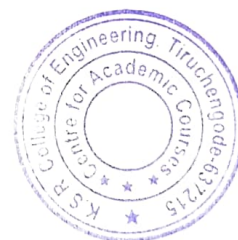
1. Kapil Kapoor, Avadesh Kumar Singh, "Knowledge Traditions and Practices of India", Vol. 1, DK Print World (P) Ltd., 2005, ISBN 81-246-0334.
2. D.N. Bose, S.N. Sen, B. V. Subbarayappa, "A Concise History of Science in India", Indian National Science Academy, New Delhi, 2009.
3. S. N. Sen, K. S. Shukla, "History of Astronomy in India", Indian National Science Academy, Second Edition, New Delhi, 2000.
4. Dr. Ravindra Singh Rana, "Indian Knowledge System of Materials in Science and Technology", Walnut Publication, 2023.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	2	1	0	2
CO2	2	2	1	0	2
CO3	3	2	1	0	3
CO4	2	2	2	0	2
CO5	2	2	1	0	2

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



OPEN ELECTIVES

CN24001	ENERGY EFFICIENT BUILDINGS	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A basic understanding of building construction processes, materials, and structural systems. Knowledge of environmental science concepts, including energy flows, sustainability, and environmental impact.							
OBJECTIVES: To understand energy-efficient building design principles and technologies for sustainable construction and to evaluate energy conservation strategies for different climates.							
UNIT - I	INTRODUCTION	(9)					
Energy Required for Building Construction - Heat Transfer – Measuring Conduction – Thermal Storage – Measurement of Radiation – The Greenhouse Effect – Psychometric Chart – Measuring Latent and Sensible Heat. Thermal Comfort – Site Planning and Development – Temperature – Humidity – Wind – Optimum Site Locations – Sun Protection – Types of Shading Devices – Conservation – Heating and Cooling loads.							
UNIT - II	PASSIVE SOLAR HEATING AND COOLING	(9)					
General Principles of Passive Solar Heating – Key Design Elements - Direct gain Trombe Walls, Water Walls, Convective Air Loops – Concepts – Case Studies – General Principles of Passive Cooling – Ventilation – Predicting Ventilation in Buildings – Window Ventilation Calculations - Radiation – Evaporation and Dehumidification – Mass Effect – Load Control – Air Filtration and odour Removal – Heat Recovery in Large Buildings.							
UNIT - III	DAYLIGHTING AND ELECTRICAL LIGHTING	(9)					
Materials, Components and Details - Insulation – Optical Materials – Radiant Barriers Glazing Materials - Day Lighting – Sources and Concepts – Building Design Strategies – Case Studies – Electric Lighting –Light Distribution – Electric Lighting Control for day lighted buildings – Illumination requirement – Components of Daylight factor – Recommended Daylight Factors – Day Lighting Analysis – Supplementary Artificial Lighting Design.							
UNIT - IV	HEAT CONTROL AND VENTILATION	(9)					
Requirements – Heat Transmission Through Building Sections – Thermal Performance of Building Sections – Orientation of Buildings – Building Characteristics for Various Climates – Thermal Design of Buildings Influence of Design Parameters – Mechanical Controls – Examples. Ventilation – Requirements – Minimum Standards for Ventilation – Ventilation Design – Energy Conservation in Ventilating systems – Design for Natural Ventilation.							
UNIT - V	DESIGN FOR CLIMATIC ZONES	(9)					
Energy Efficiency – an Overview of Design Concepts and Architectural Interventions – Energy Efficient Buildings for Various Zones – Cold and Cloudy – Cold and Sunny – Composite – Hot and Dry – Moderate – Warm and Humid – Case Studies of Residences, Office Buildings and other Buildings in Each Zones – Energy Audit – Certification.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 							
Chairman (BoS,							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Explain the energy requirement of the building construction.	Understand
CO2	Obtain the key design principles for energy efficient buildings.	Create
CO3	Articulate the concepts of day lighting and components of daylight factor.	Remember
CO4	Explain the heat transmission, heat control and ventilation.	Evaluate
CO5	Explain about the energy efficient buildings for various zones.	Understand

REFERENCES:

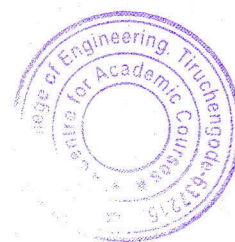
1. Hossam, A. and Gabbar., Energy Conservation in Residential, Commercial, and Industrial Facilities, Wiley-Blackwell, New Delhi, First Edition, 2018.
2. National Renewable Energy Laboratory, Passive Solar Design Strategies: Guidelines for Home Building, Central Tennessee and Northern Alabama, Scholar's Choice, First Edition, 2015.
3. Mark DeKay. and Brown, G. Z., Sun, Wind and Light Architectural Design Strategies, John Wiley & Sons, New Delhi, Third Edition, 2014.
4. Moore, F., Environmental Control Systems Heating, Cooling, Lighting, McGraw Hill, New York, First Edition, 2002.

Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high



Chairman (BoS)



CN24002	ECONOMICS AND FINANCE MANAGEMENT IN CONSTRUCTION	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: A foundational understanding of construction project management, including planning and execution processes. Basic knowledge of financial principles such as cost estimation, budgeting, and economic analysis.							
OBJECTIVES: To equip students with the skills to analyze and manage financial aspects of construction projects, including cash flow, investment evaluation, and financial management techniques.							
UNIT - I	BASIC PRINCIPLES						(9)
Time Value of Money – Cash Flow diagram – Nominal and effective interest- continuous interest. Single Payment Compound Amount Factor (P/F, F/P) – Uniform series of Payments (F/A, A/F, F/P, A/P) – Problem time zero (PTZ) - equation time zero (ETZ). Constant increment to periodic payments – Arithmetic Gradient (G), Geometric Gradient (C).							
UNIT - II	COMPARING ALTERNATIVES PROPOSALS						(9)
Comparing alternatives- Present Worth Analysis, Annual Worth Analysis, Future Worth Analysis, Rate of Return Analysis (ROR) and Incremental Rate of Return (IROR) Analysis, Benefit/Cost Analysis, Break Even Analysis.							
UNIT - III	EVALUATING ALTERNATIVE INVESTMENTS						(9)
Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax before and after depreciation – Value Added Tax (VAT) – Inflation.							
UNIT - IV	FUNDS MANAGEMENT						(9)
Project Finance – Sources of finance - Long-term and short -term finance, Working Capital Management, Inventory valuation, Mortgage Financing - International financial management-foreign currency management.							
UNIT - V	FUNDAMENTALS OF MANAGEMENT ACCOUNTING						(9)
Management accounting, Financial accounting principles- basic concepts, Financial statements – accounting ratios - funds flow statement – cash flow statement.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

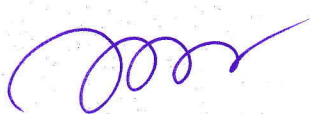
COs	Course Outcome	Cognitive Level
CO1	Apply knowledge on concept of cash flow and payment factors.	Apply
CO2	Evaluate worth analysis and comparing alternatives.	Analyse
CO3	Analyse value added tax and alternative investments.	Analyse
CO4	Recognize the importance of working capital management, budgeting and control.	Remember
CO5	Prepare income, profit and loss statements and implement management accounting.	Understand

REFERENCES:

1. Collier, C. and Gla Gola, C., Engineering Economics & Cost Analysis, Addison Wesley Education Publishers, New Delhi, Third Edition, 2017.
2. Shrivastava, U.K., Construction Planning and Management, Galgotia Publications, New Delhi, Third Edition, 2016.
3. Patel, B.M., Project Management - Strategic Financial Planning, Evaluation and Control, Vikas Publishing House, Chennai, Second Edition, 2011
4. <https://nptel.ac.in/courses/105/103/105103023/>

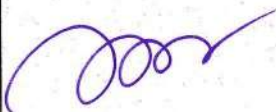
Mapping of COs with POs and PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	
CO1	3	-	2	2	3	
CO2	3	-	2	2	3	
CO3	2	-	3	2	3	
CO4	2	-	3	2	3	
CO5	3	-	3	2	3	
Avg.	3	-	3	2	3	

1-low, 2-medium, 3-high



Chairman (BoS)



CN24O03	STRESS MANAGEMENT	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
(M.E.- CONSTRUCTION ENGINEERING AND MANAGEMENT)							
PREREQUISITE: Basic understanding of human behavior, communication, and workplace dynamics. Familiarity with personal time management and self-regulation techniques. An interest in self-development, mental well-being, and emotional intelligence is beneficial.							
OBJECTIVES: To help students identify stress triggers and effectively manage them through practical strategies and to develop skills in time management, crisis handling, workplace communication, and self-improvement.							
UNIT - I	UNDERSTANDING STRESS						(9)
Meaning – Symptoms – Works Related Stress – Individual Stress – Reducing Stress – Burnout.							
UNIT - II	COMMON STRESS FACTORS TIME & CAREER PLATEAUING						(9)
Time Management – Techniques – Importance of planning the day – Time management schedule – Developing concentration – Organizing the Work Area – Prioritizing – Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say ‘No’.							
UNIT - III	CRISIS MANAGEMENT						(9)
Implications – People issues – Environmental issues –Psychological fall outs – Learning to keep calm – Preventing interruptions – Controlling crisis – Importance of good communication – Taking advantage of crisis – Pushing new ideas – Empowerment.							
UNIT - IV	WORK PLACE HUMOUR						(9)
Developing a sense of Humour – Learning to laugh – Role of group cohesion and team spirit – Using humour at work – Reducing conflicts with humour.							
UNIT - V	SELF DEVELOPMENT						(9)
Improving Personality – Leading with Integrity – Enhancing Creativity – Effective decision Making – Sensible Communication – The Listening Game – Managing Self – Meditation for peace – Yoga for Life.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

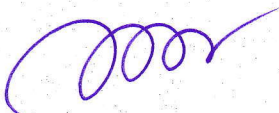
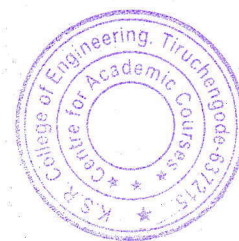
COs	Course Outcome	Cognitive Level
CO1	Recognize your stress triggers and how to manage them.	Apply
CO2	Apply the time management skills in effective manner.	Apply
CO3	Handle the various crisis with full of confidence.	Evaluate
CO4	Solve the various conflicts with humour sense.	Apply
CO5	Improve the personality, creativity and decision making skills.	Create

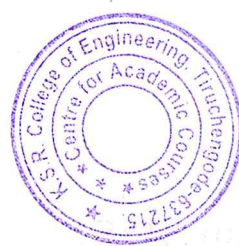
REFERENCES:

1. Argyle., The Psychology of Happiness, Tata McGraw Hill, New Delhi, Second Edition, 2012.
2. Bartlet., Stress Perspectives & Process, Tata McGraw Hill, New Delhi, Sixth Edition, 2012.
3. Juan, R. Alascal Brucata. Laurel Brucata. and Daisy Chauhan., Stress Mastery, Pearson Education, New Delhi, Fourth Edition.
4. Jeff Davidson., Managing Stress, Prentice Hall of India, New Delhi, Fourth Edition, 2012.

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	2	3
CO2	3	-	2	2	3
CO3	2	-	3	2	3
CO4	2	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-low, 2-medium, 3-high


Chairman (BoS,


PE24001	SWITCHING CONCEPTS AND POWER SEMICONDUCTOR DEVICES	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE:							
Basic understanding of semiconductor devices and circuit theory, including diode and transistor operation; is essential to grasp power device switching behavior and protection strategies.							
OBJECTIVE:							
To analyze, model, and simulate the operation of current- and voltage-controlled power semiconductor devices along with their firing and protection circuits.							
UNIT - I	INTRODUCTION OF SWITCHING CONCEPTS						(9)
Need for switching in power electronic circuits – Switching Characteristics – Ideal switch, practical switch – Types of switches – Comparison of switching devices – Future trends in power devices.							
UNIT - II	CURRENT CONTROLLED DEVICES						(9)
Power Diode, Thyristors and BJT's: Construction, static and dynamic characteristics – Negative temperature coefficient and secondary breakdown – Power Darlington – Series and parallel operation – Comparison of BJT and Thyristor – Steady state and dynamic models of BJT and Thyristor – Simulation of Thyristor and BJT.							
UNIT - III	VOLTAGE CONTROLLED DEVICES						(9)
Principle of voltage-controlled devices – Power MOSFETs and IGBTs: Construction, Types, Static and switching characteristics – Series and parallel operation – Steady state and dynamic models of MOSFET and IGBTs – Basics of GTO, MCT, FCT, RCT and IGCT – Simulation of MOSFET and IGBT.							
UNIT - IV	FIRING PROTECTION CIRCUITS						(9)
Necessity of isolation, Pulse transformer, Opto coupler – Gate Drives Circuit: SCR, MOSFET, IGBTs and base driving for power BJT – Over voltage, over current and gate protections – Design of snubbers.							
UNIT - V	THERMAL PROTECTION CIRCUITS						(9)
Heat Transfer: Conduction, convection and radiation – Cooling: liquid cooling, vapor-phase cooling – Guidance for heat sink selection – Thermal resistance and impedance – Electrical analogy of thermal components – Heat sink types and design – Mounting types.							
LECTURE: 45, SELF LEARNING = 45, TOTAL = 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Summarize the power semiconductor device types and characteristics.	Understand
CO2	Explain the construction, operating principles, and characteristics of various current control devices.	Understand
CO3	Explain the construction, operating principles, and characteristics of voltage-controlled devices.	Understand
CO4	Design the firing and protection circuits for power devices.	Apply
CO5	Explain the various methods of thermal protection and cooling.	Understand

TEXT BOOKS:

1. Rashid M.H., "Power Electronics Circuits, Devices and Applications", Prentice Hall India, New Delhi, Third Edition, 2013.
2. Singh M.D., Khanchandani K.B., "Power Electronics", Tata McGraw-Hill, 2014.

REFERENCES:

1. Ned Mohan, Undeland and Robins, "Power Electronics – Concepts, Applications and Design, John Wiley and Sons, Singapore, Third Edition, 2009.
2. Joseph Vithayathil, Power Electronics: Principles and Applications, Delhi, Tata McGraw-Hill, 2010.
3. Simon Ang and Alejandro Oliva, "Power Switching Converters", Taylor & Francis Group, 2010.
4. Christophe P. Basso, Switch-Mode Power Supplies, McGraw-Hill, 2014.

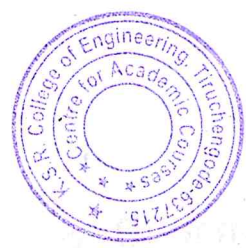
Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	1	1	-	-
CO2	3	2	2	-	-
CO3	3	2	1	-	-
CO4	3	3	3	-	-
CO5	3	3	3	-	-

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



PE24002	SMART GRID TECHNOLOGY	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Basic knowledge of electrical power systems and communication networks is required to understand the integration and automation aspects of Smart Grid technologies.							
OBJECTIVE: To understand the concepts, components, and communication technologies essential for implementing and operating Smart Grids effectively.							
UNIT - I	INTRODUCTION	(9)					
Electrical Grid – Definition of Smart Grid – Opportunities, Challenges and Benefits of Smart Grid – Difference between conventional and Smart Grid – Operating Principles and Models of Smart Grid Components – Implementation of Smart Grid – Early Smart Grid initiatives in India – Overview of the technologies required for the Smart Grid.							
UNIT - II	SMART METERING AND DEMAND-SIDE INTEGRATION	(9)					
Introduction – Smart metering – Smart meters – An overview of the hardware used – Communications infrastructure and protocols for smart metering, Demand – Side integration – Services provided by DSI – Implementations of DSI – Hardware support to DSI implementations – Flexibility delivered by prosumers from the demand side – System support from DSI.							
UNIT - III	DISTRIBUTION AUTOMATION	(9)					
Distribution automation – Automated Meter Reading (AMR) – Advanced Metering Infrastructure (AMI) – Intelligent Electronic Devices (IED) – Fault Location Isolation and Service Restoration (FLISR) – Outage Management Systems (OMS) – High Efficiency Distribution Transformers.							
UNIT - IV	TRANSMISSION SYSTEM AUTOMATION	(9)					
Substation automation, Feeder Automation – Supervisory Control and Data Acquisition (SCADA) – Energy Management System (EMS) – Phasor Measurement Units (PMU) – Wide Area Monitoring Systems (WAMS).							
UNIT - V	HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS	(9)					
Local Area Network (LAN) – House Area Network (HAN) – Wide Area Network (WAN) – Broadband over Power Line (BPL) – IP-based Protocols – Basics of Web Service and CLOUD Computing to make Smart Grids smarter – Cyber Security for Smart Grid.							
LECTURE: 45, SELF LEARNING = 45, TOTAL = 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Portray the components used in smart grid technologies.	Understand
CO2	Illustrate the concept of smart metering and demand-side integration.	Understand
CO3	Elucidate the concepts of distribution automation in the smart grid.	Understand
CO4	Outline the automated transmission systems in the smart grid.	Understand
CO5	Enlighten the significance of high-performance computing in the smart grid.	Understand

TEXT BOOKS:

1. Stuart Borlase, Smart Grid: Infrastructure, Technology and Solutions, CRC Press, United States, First Edition, 2012.
2. James Momoh, Smart Grid: Fundamentals of Design and Analysis, John Wiley and Sons, United States, First Edition, 2012.

REFERENCES:

1. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, Smart Grid Technology and Applications, John Wiley and Sons, United States, First Edition, 2012.
2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang, Smart Grid-The New and Improved Power Grid: A Survey, IEEE Transactions on Smart Grids, 2012.
3. Ryszard Strzelecki, Grzegorz Benysek, Power Electronics in Smart Electrical Energy Networks, Springer, New Zealand, First Edition, 2008.
4. <https://nptel.ac.in/courses/108/107/108107113/>.

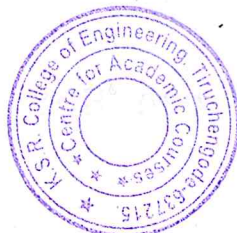
Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	-	-
CO2	3	2	2	-	-
CO3	3	2	2	-	-
CO4	3	2	2	-	-
CO5	3	2	2	-	-

1- Low, 2 - Medium, 3 - High


Chairman (BOS)



PE24O03	RENEWABLE ENERGY TECHNOLOGY	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Basic understanding of electrical circuits, energy systems, and environmental science is essential to grasp the technologies and integration of renewable energy sources.							
OBJECTIVE: To study various renewable energy technologies, storage systems, and their integration with the power grid for sustainable energy solutions.							
UNIT - I	INTRODUCTION TO RENEWABLE ENERGY					(9)	
Energy Scenario – Classification of Energy Sources – Energy needs of India and energy consumption patterns – Worldwide Potentials of these sources – Energy efficiency, energy security – Energy and its environmental impacts – Distributed generation.							
UNIT - II	SOLAR PV AND THERMAL SYSTEMS					(9)	
Solar Radiation – Radiation Measurement – Solar thermal Systems: Types of collectors, efficiency calculations – Photovoltaic (PV) technology: Present status, solar cells, cell technologies – characteristics of PV systems – equivalent circuit – array design – building integrated PV system, its components, sizing and economics – Peak power operation – series and parallel connections – maximum power point tracking – Applications.							
UNIT - III	WIND ENERGY					(9)	
Wind speed and power relation – power extracted from wind – wind distribution and wind speed predictions – Wind power systems: system components, Types of turbines, Turbine rating – Choice of generators – turbine rating – electrical load matching – Variable speed operation – maximum power operation – control systems – system design features.							
UNIT - IV	ENERGY STORAGE SYSTEM					(9)	
Energy storage – Battery – types, equivalent circuit, performance characteristics – battery design – charging and charge regulators – Battery management – Flywheel-energy relations – components – benefits over battery – Fuel Cell energy storage systems – Ultra Capacitors.							
UNIT - V	GRID INTEGRATION					(9)	
Standalone systems – Concept of Micro Grid and its components – load sharing – system sizing – Hybrid system economics – Interface requirements – Stable operation – Transient – safety, operating limits of voltage, frequency, stability margin, energy storage, and load scheduling – Effect on power quality – Case study on Standalone and grid-interactive solar systems and wind systems.							
LECTURE: 45, SELF LEARNING = 45, TOTAL = 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Describe the various energy sources and environmental aspects of energy.	Understand
CO2	Explain the principle of solar photovoltaic systems and their applications.	Understand
CO3	Familiarize with the wind energy conversion process and control of the wind system.	Understand
CO4	Explain the energy storage system and management.	Understand
CO5	Examine real-world case studies to understand the practical applications of solar and wind energy in both standalone and grid-connected systems.	Apply

TEXT BOOKS:

1. Chetan Singh Solanki, "Solar Photovoltaics: Fundamentals, Technologies and Applications", PHI Learning, New Delhi, third Edition, 2015.
2. Kothari D.P., Singal, K.C., and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, PHI Learning, Third Edition, 2021.

REFERENCES:

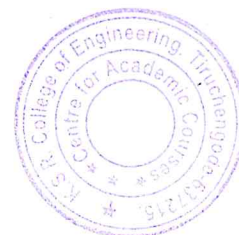
1. Rai, G.D., Non-conventional energy sources, Khanna Publishers, Second Edition, 2012.
2. Dr.Reeta Pawar, Dr. M.V.K. Srivani, Prof. Thorat S.K., Itum Ruti, "Fundamentals of Renewable Energy Conservation and Technology", AG Publishing House, 2023.
3. Khan, B.H. Non-conventional Energy Resources, Tata McGraw-Hill Publishing Company, New Delhi, First Edition, 2017.

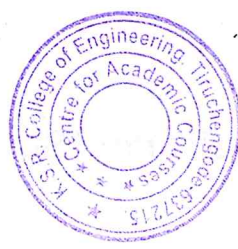
Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	-	-
CO2	2	2	2	-	-
CO3	2	2	2	-	-
CO4	2	2	3	-	-
CO5	2	2	3	-	-

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



PE24004	ENERGY MANAGEMENT AND CONSERVATION	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Basic knowledge of thermodynamics, electrical systems, and economic principles is essential to understand energy flow, auditing, and management strategies.							
OBJECTIVE: To impart knowledge on energy management practices, auditing techniques, and economic evaluation for enhancing energy efficiency in various systems.							
UNIT - I	INTRODUCTION TO ENERGY MANAGEMENT AND AUDIT						(9)
Classification of energy – Energy scenario – Energy needs of a growing economy – Energy pricing in India – Energy and environment – Energy conservation act. Energy Audit: Types and methodology – Energy audit instruments – Role of energy managers and auditors.							
UNIT - II	THERMAL UTILITIES						(9)
Steam: Introduction, Properties of steam, Steam distribution systems – Boilers: Types and classification, Performance evaluation of boilers – Losses in boiler – Energy conservation opportunities in boilers – Waste heat recovery: Classification, Advantages and applications, commercially viable waste heat recovery devices, Saving potential.							
UNIT - III	ELECTRICAL AND LIGHTING SYSTEM						(9)
Introduction to electric power supply systems – Electrical load management and maximum demand control – Power factor improvement and its benefit, Basic parameters and terms in lighting systems – Luminous performance Characteristics of commonly used luminaries and Energy saving opportunities in lighting systems.							
UNIT - IV	ENERGY CONSERVATION IN BUILDINGS AND ECBC						(9)
About Energy Conservation Building Code (ECBC) – Building envelope, Fenestrations, Insulation, HVAC, Lighting, Water pumping, Inverter – Elevators and Escalators – Star labeling for existing buildings.							
UNIT - V	ECONOMICS						(9)
Investment – Need, Appraisal and criteria – Financial analysis techniques – Simple payback period – Return on investment – Net present value – Internal rate of return – Cash flows, Risk and sensitivity analysis – Financing options – Energy performance contracting and role of ESCOs.							
LECTURE: 45, SELF LEARNING = 45, TOTAL = 90 PERIODS							
							

Chairman (BoS)

COURSE OUTCOMES:

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

COs	Course Outcome	Cognitive Level
CO1	Interpret the importance of energy, energy conservation and energy audit.	Understand
CO2	Examine the energy-saving opportunities in thermal systems.	Apply
CO3	Apply the energy-saving opportunities in lighting systems.	Apply
CO4	Assess the energy conservation in buildings and ECBC.	Understand
CO5	Analyze the different financial management techniques for energy management.	Analyze

TEXT BOOKS:

1. Guide Books for National Certification Examination for energy managers and Auditors, third Edition, Bureau of Energy Efficiency, 2010.
2. Wayne C. Turner & Steve Doty, Energy Management Handbook, Seventh Edition, The Fairmont Press, 2009.

REFERENCES:

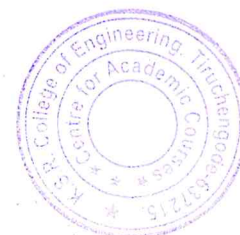
1. <https://beeindia.gov.in/>
2. Barney L. Capehart, Wayne C. Turner, William J. Kennedy, Guide to Energy Management, Seventh Edition, The Fairmont Press, 2012.
3. Barney L. Capehart, Wayne C. Turner, William J. Kennedy, "Guide to Energy Management", CRC press, Taylor & Francis group, Eighth Edition, 2016.
4. Witte. L.C., P.S. Schmidt, D.R. Brown, Industrial Energy Management and Utilization, Hemisphere, First Edition, 1988.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	1	-	-	-
CO2	2	1	-	-	-
CO3	2	1	-	-	-
CO4	2	1	-	-	-
CO5	2	1	-	-	-

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



ST24001	PRINCIPLES OF SUSTAIBALE DEVELOPEMENT	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Basic knowledge of environmental science and understanding of economic and social systems are prerequisites for studying the principles of sustainable management.							
OBJECTIVES: To understand the environmental, social, and economic dimensions of sustainability explore global principles and agreements; and develop an action-oriented mindset to apply sustainable practices in personal, professional, and policy decisions.							
UNIT - I	SUSTAINABILITY AND DEVELOPMENT CHALLENGES	(9)					
Definition of sustainability - Environmental, Economic and Social dimensions of sustainability - Sustainable Development Models - Strong and Weak Sustainability - Defining Development-Millennium Development Goals - Mindsets for Sustainability : Earthly, Analytical, Precautionary, Action and Collaborative - Syndromes of Global Change: Utilization Syndromes, Development Syndromes, and Sink Syndromes - Core problems and Cross Cutting Issues of the 21 Century - Global, Regional and Local environmental issues - Social insecurity - Resource Degradation - Climate Change - Desertification							
UNIT - II	PRINCIPLES AND FRAME WORK	(9)					
History and emergence of the concept of sustainable development - Our Common Future - Stockholm to Rio plus 20 - Rio Principles of Sustainable Development - Precautionary Principle - Polluter Pays Principle - Role of Civil Society, Business and Government - Natural Step - Peoples Earth Charter - Business Charter for Sustainable Development - UN Global Compact - Agenda 21							
UNIT - III	SUSTAINABLE LIVELI HOOD	(9)					
The Unjust World and inequities - Quality of Life - Poverty, Population and Pollution - Combating Poverty - Millennium Development Goals, Indicators, Targets, Status and intervention areas - Demographic dynamics of sustainability - Strategies to end Rural and Urban Poverty and Hunger - Sustainable Livelihood Framework - Health, Education and Empowerment of Women, Children, Youth, Indigenous People, Non-Governmental Organizations, Local Authorities and Industry for Prevention, Precaution , Preservation and Public participation.							
UNIT - IV	SUSTAINABLE SOCIO-ECONOMIC SYSTEM	(9)					
Protecting and Promoting Human Health - Investing in Natural Capital - Agriculture, Forests, Fisheries - Food security and nutrition and sustainable agriculture - Water and sanitation - Biodiversity conservation and Ecosystem integrity - Ecotourism - Urbanization and Sustainable Cities - Sustainable Habitats - Green Buildings - Sustainable Transportation - Sustainable Consumption and Production - Sustainable Mining - Sustainable Energy - Climate Change - Mitigation and Adaptation - Safeguarding Marine Resources - Financial Resources and Mechanisms							
UNIT - V	ASSEESING PROGRESS AND WAY FORWARD	(9)					
Nature of sustainable development strategies and current practice - Sustainability in global, regional and national context - Rio Plus 20 - Approaches to measuring and analysing sustainability - limitations of GDP- Ecological Footprint- Human Development Index- Human Development Report - National initiatives for Sustainable Development - Hurdles to Sustainability - Operational							

guidelines - Science and Technology for sustainable development - Performance indicators of sustainability and Assessment mechanism - Inclusive Green Growth and Green Economy - National Sustainable Development Strategy Planning - Governance - Science and Technology- Sustainability Education

LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand the key concepts and dimensions of sustainability and global environmental challenges.	Understand
CO2	Interpret major principles, frameworks, and global agreements on sustainable development.	Analyze
CO3	Assess livelihood strategies and the role of marginalized groups in sustainable development.	Analyze
CO4	Analyze sustainable socio-economic systems including agriculture, energy, and urban development.	Analyze
CO5	Apply sustainability indicators and tools to evaluate progress and recommend future strategies.	Apply

REFERENCES

1. Barry Dalal Clayton and Stephen Bass, Sustainable Development Strategies- a resource book", Earthscan Publications Ltd, London, 2002.
2. Karel Mulder, Sustainable Development for Engineers - A Handbook and Resource Guide, Green Leaf Publishing, 2006.
3. MoEF "Sustainable Development in India –stocktaking in the Run up to Rio plus 20", Ministry of Environment and Forests, Government of India, New Delhi. 2012,
4. UNEP, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, www.unep.org/greeneconomy, ISBN: 978-92-807-3143-9, 2011

Mapping of COs with POs and PSOs					
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	2	3	2
CO2	3	-	2	3	3
CO3	3	-	3	3	3
CO4	3	-	3	3	3
CO5	3	-	2	3	2
Avg.	3	-	2	3	3

1-low, 2-medium, 3-high

Chairman (BoS)

ST24O02	FAILURE ANALYSIS OF STRUCTURES	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: A basic understanding of structural engineering principles, material science, and mechanics of materials is essential. Familiarity with construction practices and failure modes in civil structures will aid comprehension. Knowledge of engineering mathematics and analytical modeling is also recommended.							
OBJECTIVES: To understand the causes and types of structural failures, explore material defects, loading and environmental factors, apply failure theories, study structural system behavior, and examine smart structures with sensors and adaptive systems.							
UNIT - I	Introduction to Failure Mechanisms					(9)	
Causes of failure - Types of failure - Why, what, how - Durability of materials - Landmark - Case - Performance and shape inadequacy - Statistics and reliability - Life cycle assessment							
UNIT - II	Structural Failures and Material Deterioration					(9)	
Structural failure - Material and load effects - Environment effect - Non-structural and structural repairs - Biocidal treatment and use of preservatives - Deterioration of wood							
UNIT - III	Failure Analysis and Safety Evaluation					(9)	
Macro micro level failures - Component and sub-system failures - Failure theories - Analytical models - Cases and type of problem in components - Safety evaluation.							
UNIT - IV	Structural System Failures and Rehabilitation Techniques					(9)	
Structural systems - case studies - Pin-jointed steel systems - Rigid jointed frames - Concrete walls arches - Reinforced concrete beams and frames - Shells - Repair of concrete bridge and water retaining structures.							
UNIT - V	Maintenance, Refurbishment, and Smart Systems					(9)	
Bridge maintenance techniques - The refurbishment of buildings, legal responsibilities - Case studies - Definition of smartness - Sensors - Automatic and adaptive systems - Smart components.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Identify and classify different types of structural failures and explain the underlying causes.	Understand
CO2	Explain the mechanisms of structural failure due to material inadequacies and load effects.	Understand
CO3	Classify failure types in structural components through real-world case studies and diagnostics.	Analyze
CO4	Explain the behaviour of different structural systems, including steel trusses, rigid frames, shells, and arches.	Understand
CO5	Describe various bridge maintenance techniques and evaluate their applicability in different scenarios.	Understand

REFERENCES:

1. D Schiff, "Dynamic Analysis & Failure Modes of Simple Structures", John Wiley & Sons Inc, ISA, First Edition, 1990.
2. Wanhill R, Barter S, Molent L, "Fatigue Crack Growth Failure and Lifting Analyses for Metallic Aircraft Structures and Components", Springer, Germany, Nineteenth Edition, 2019.
3. Ravindran G, Mahesh V, Kassem M M, "Failure Analysis: Structural Health Monitoring of Structure and Infrastructure Components", Intech Open, United Kingdom, First Edition, 2023.
4. <https://archive.nptel.ac.in/courses/112/107/112107241/>

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	3	3
CO2	3	-	3	2	3
CO3	3	-	3	2	2
CO4	3	-	3	2	3
CO5	3	-	3	2	3
Avg.	3	-	3	2	3

1-Low, 2-Medium, 3-High


Chairman (BoS)



ST24O03	SMART MATERIALS AND SMART STRUCTURES	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
(M.E.- STRUCTURAL ENGINEERING)							
PREREQUISITE: Basic knowledge of structural engineering, mechanics of materials, and civil engineering materials.							
OBJECTIVES:							
To study the functions of smart materials and structures with integrated sensing and actuation, understand strain measurement techniques, explore sensing technologies, examine actuator systems like piezoelectric and shape memory materials, and understand data acquisition, signal processing, and control in smart structures.							
UNIT - I	INTRODUCTION						(9)
Introduction to smart materials and structures - Instrumented structure functions and response - sensing systems - Self-diagnosis - Signal processing consideration - Actuation systems and effectors.							
UNIT - II	MEASURING TECHNIQUES						(9)
Strain measuring techniques using electrical strain gauges, types - Resistance - Capacitance - inductance - Wheatstone bridges - Pressure transducers - Load cells - Temperature compensation - Strain rosettes.							
UNIT - III	SENSORS						(9)
Sensing technology - Types of sensors - Physical measurement using piezo electric strain measurement - Inductively read transducers - LVDT - Fibre optic techniques - Chemical and bio-chemical sensing in structural assessment - Absorptive chemical sensors - Spectroscopes - Fibre optic chemical sensing systems and Distributed measurement.							
UNIT - IV	ACTUATORS						(9)
Actuator techniques - Actuator and actuator materials - Piezoelectric and electro structure material - Mangle to stricture material - Shape memory alloys - Electro rheological fluids - Electromagnetic actuation - Role of actuators and actuator materials.							
UNIT - V	SIGNAL PROCESSING AND CONTROL SYSTEMS						(9)
Data acquisition and processing - Signal processing and control for smart structures - Sensors as geometrical Processors - Signal processing - Control system - Linear and nonlinear.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

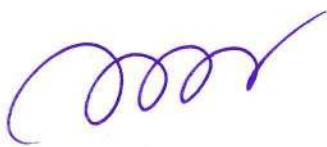
COs	Course Outcome	Cognitive Level
CO1	Explain about the instrumented structure functions and response in modern engineering.	Understand
CO2	Examine the strain measuring techniques using strain gauges.	Analyze
CO3	Choose sensors according to their applications in structures	Apply
CO4	Classify the actuator materials based on their applications	Analyze
CO5	Explain about data acquisition system and control system.	Understand

REFERENCES:

1. Srinivasan, A. V., Michael Mc Farland D., Smart Structures Analysis and Design, Cambridge University Press, England, South Asian Edition, 2010.
2. Peter L. Reece., Smart Materials and Structures: New Research, Nova Science Publishers Inc., New York, First Edition, 2007.
3. Gustav Gautschi., Piezoelectric Sensorics, Springer, New York, Second Edition, 2006.
4. Gandhi, M.V., and Thompson, B.D., Smart materials and structures, Springer, New York, First Edition, 2014

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	3	3
CO2	2	-	3	2	3
CO3	2	-	3	3	3
CO4	3	-	3	2	3
CO5	3	-	3	3	3
Avg.	3	-	3	3	3

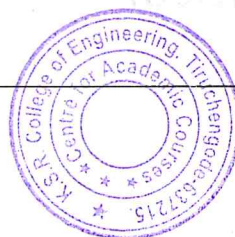
1-low, 2-medium, 3-high


Chairman (BoS)



ET24001	EMBEDDED SYSTEMS	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Fundamentals of digital electronics and microprocessors, along with basic programming knowledge in C or assembly language.							
OBJECTIVE: To design, model, and develop reliable embedded systems using both hardware and software components across diverse application domains.							
UNIT - I	OVERVIEW OF EMBEDDED SYSTEMS	(9)					
Embedded Systems Vs General computing systems – Selection of Embedded processor – DMA – Memory devices – Memory management methods – Memory mapping, cache replacement policies – Timer and Counting devices, Watchdog Timer, Real Time Clock – Software Development tools – IDE, assembler, compiler, linker, simulator, debugger, In-circuit emulator, Target Hardware Debugging – Overview of functional safety standards for embedded systems.							
UNIT - II	EMBEDDED NETWORKING	(9)					
I/O Device Ports & Buses – Multiple interrupts and interrupt service mechanism – Serial communication protocols: RS232 standard – RS485 – USB – Inter Integrated Circuits (I2C) – CAN Bus – Parallel communication using PCI, PCI-X buses, ARM bus – Wireless protocol: Wi-Fi – Bluetooth – Zigbee – Introduction to Device Drivers.							
UNIT - III	HARDWARE/SOFTWARE MODELLING	(9)					
Modeling embedded systems – Embedded software development approach – Overview of UML modeling – UML diagrams – Hardware/Software Partitioning, Co-Design Approaches for System Specification and modeling – Features Comparing Single-processor Architectures and Multi-Processor Architectures – Design approach on parallelism in Uniprocessors and Multiprocessors.							
UNIT - IV	RTOS BASED EMBEDDED SYSTEM DESIGN	(9)					
Introduction to basic concepts of RTOS – Task, Process & threads – Interrupt routines in RTOS – Multiprocessing and Multitasking – Preemptive and non-preemptive scheduling – Task communication – Context switching – Shared memory – Message passing – Interprocess communication – synchronization between processes – Semaphores – Mailbox – Pipes – Priority inversion – Priority inheritance – Comparison of Real-time Operating systems: VxWorks, uC/OS-II, RT Linux.							
UNIT - V	EMBEDDED SYSTEM APPLICATION DEVELOPMENT	(9)					
Objective, need, different phases and Modelling of the EDLC – Choice of Target Architectures for Embedded Application Development – Data Dominated Systems – Case studies: Digital Camera – Adaptive Cruise control in a Car – Mobile Phone software for key inputs.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							


Chairman (BoS)



COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Demonstrate the functionalities of processor internal blocks, with their requirement.	Apply
CO2	Recognize the Bus standards chosen based on interface overheads without sacrificing processor performance.	Apply
CO3	Illustrate that using multiple CPUs based on either hardcore or softcore helps data overhead management with processing speed reduction.	Apply
CO4	Describe the role and features of the RT operating system, that makes multitask execution possible by processors	Apply
CO5	Recommend Embedded consumer product design based on phases of product development.	Apply

TEXT BOOKS

1.	Rajkamal, "Embedded System: Architecture, Programming, Design", TMH, 2011.
2.	Peckol, "Embedded system Design", John Wiley & Sons, 2010.

REFERENCES:

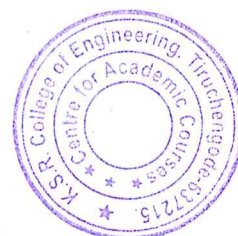
1.	Rajiv Chopra, "Advanced Computer Architecture", S. Chand, 2010.
2.	Elicia White, "Making Embedded Systems", O'Reilly Series, SPD, 2011.
3.	Bruce Powel Douglass, Real-Time UML Workshop for Embedded Systems, Elsevier, 2011.
4.	Lyla B.Das, "Embedded Systems: An Integrated Approach", Pearson, 2013.

Mapping of COs with POs and PSOs

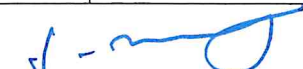
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	2	-	3	-	-
CO2	2	-	1	-	-
CO3	2	-	2	-	-
CO4	2	-	3	-	-
CO5	2	-	1	-	-

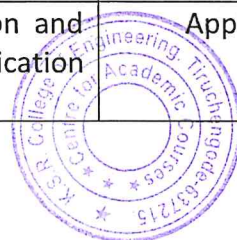
1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



ET24O02	EMBEDDED CONTROL	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Basic understanding of electrical machines, power electronics, and microcontrollers. Familiarity with control systems and programming in C/C++ is advantageous.							
OBJECTIVE: To develop intelligent, embedded-controlled electric drive systems for industrial automation and robotic applications.							
UNIT - I	INTRODUCTION TO ELECTRICAL DRIVES					(9)	
Electric drive and its classification, Four-quadrant drive, dependence of load torque on various factors, Dynamic of motor – load Combination – Solid controlled Drives – Machine learning and optimization techniques for electrical drives – IoT for Electrical drives applications.							
UNIT - II	OVERVIEW OF EMBEDDED PROCESSOR					(9)	
Embedded Processor architecture – RTOS – Hardware/software co-design-Programming with Soc processors.							
UNIT - III	INDUCTION MOTOR CONTROL					(9)	
Types-speed control methods – PWM techniques – VSI fed three-phase induction motor – Fuzzy logic based speed control for three-phase induction motor – FPGA based three-phase induction motor control.							
UNIT - IV	BLDC MOTOR CONTROL					(9)	
Overview of BLDC motor – speed control methods – PWM techniques – ARM processor-based BLDC motor control – ANN for BLDC motor control application.							
UNIT - V	INDUSTRIAL AUTOMATION & ROBOTICS CONTROL					(9)	
Industrial Automation: Role of embedded systems in automation, including PLCs, HMIs, and communication protocols. Robotics: Integration of embedded control in robotic systems, covering sensors, actuators, kinematics, and path planning.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
COURSE OUTCOMES: At the end of the course, the learners will be able to:							
COs	Course Outcome					Cognitive Level	
CO1	Interpret the significance of embedded control for electrical drives.					Understand	
CO2	Describe various control strategy for electric drives.					Understand	
CO3	Apply control techniques like PWM, fuzzy logic, and FPGA to implement speed control for induction motors.					Apply	
CO4	Apply ARM-based and ANN-based methods to control the speed of BLDC motors in embedded systems.					Apply	
CO5	Apply embedded control strategies for industrial automation and robotic systems using sensors, actuators, and communication interfaces.					Apply	


Chairman (BoS)



TEXT BOOKS:

1. R.Krishnan, "Electric Motor Drives-Modeling, Analysis and Control", Prentice-Hall of India Pvt. Ltde., New Delhi, 2010.
2. Vedamsubramaniam, "Electric Drives – Concepts and Applications", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2002

REFERENCES:

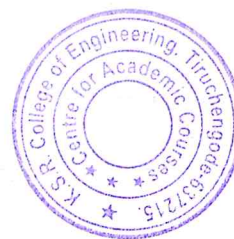
1. K. Venkataratnam, Special Electrical Machines, Universities Press, 2014.
2. Steve Furber, 'ARM system on chip architecture', Addison Wesley, 2010.
3. Ron Sass and Andrew G. Schmid, Embedded System Design with Platform FPGAs: Principles and Practices, Elsevier, 2010.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	1	-	2	-	-
CO2	1	1	3	-	-
CO3	2	-	-	-	-
CO4	1	2	3	-	-
CO5	2	-	-	-	-

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



ET24003	EMBEDDED AUTOMATION	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Basic knowledge of digital electronics, microcontrollers, and programming in C or any procedural language. Familiarity with electronics lab tools is an added advantage.							
OBJECTIVE: To develop embedded C programming skills for real-time applications involving microcontroller interfacing, vision systems, and home automation.							
UNIT - I	INTRODUCTION TO EMBEDDED C PROGRAMMING 9					(9)	
C Overview and Program Structure – C Types, Operators and Expressions – C Control Flow – C Functions and Program Structures – C Pointers and Arrays – FIFO and LIFO – C Structures – Development Tools.							
UNIT - II	AVR MICROCONTROLLER					(9)	
ATMEGA 16 Architecture – Nonvolatile and Data Memories – Port System – Peripheral Features: Time Base, Timing Subsystem, Pulse Width Modulation, USART, SPI, Two Wire Serial Interface, ADC, Interrupts – Physical and Operating Parameters.							
UNIT - III	HARDWARE AND SOFTWARE INTERFACING WITH 8-BIT SERIES CONTROLLERS					(9)	
Lights and Switches – Stack Operation – Implementing Combinational Logic – Expanding I/O – Interfacing Analog to Digital Convertors – Interfacing Digital to Analog Convertors – LED Displays: Seven Segment Displays, Dot Matrix Displays – LCD Displays – Driving Relays – Stepper Motor Interface – Serial EEPROM – Real Time Clock – Accessing Constants Table – Arbitrary Waveform Generation – Communication Links – System Development Tools.							
UNIT - IV	VISION SYSTEM					(9)	
Fundamentals of Image Processing – Filtering – Morphological Operations – Feature Detection and Matching – Blurring and Sharpening – Segmentation – Thresholding – Contours – Advanced Contour Properties – Gradient – Canny Edge Detector – Object Detection – Background Subtraction.							
UNIT - V	HOME AUTOMATION					(9)	
Home Automation – Requirements – Water Level Notifier – Electric Guard Dog – Tweeting Bird Feeder – Package Delivery Detector – Web Enabled Light Switch – Curtain Automation – Android Door Lock – Voice Controlled Home Automation – Smart Lighting – Smart Mailbox – Electricity Usage Monitor – Proximity Garage Door Opener – Vision Based Authentic Entry System.							
LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS							
 Chairman (BoS) 							

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand the 8-bit series microcontroller architecture, features and pin details.	Understand
CO2	Write embedded C programs for embedded system applications.	Apply
CO3	Develop real-time systems using AVR microcontrollers.	Understand
CO4	Develop the systems based on the vision mechanism.	Apply
CO5	Develop a real-time home automation system for home needs.	Apply

TEXT BOOKS:

1. Dhananjay V. Gadre, Programming and Customizing the AVR Microcontroller, McGraw-Hill, 2001.
2. Joe Pardue, C Programming for Microcontrollers, Smiley Micros, 2005.

REFERENCES:

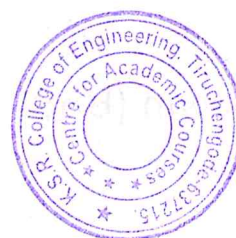
1. Steven F. Barrett, Daniel J. Pack, ATMEL AVR Microcontroller Primer: Programming and Interfacing, Morgan & Claypool Publishers, 2012.
2. Mike Riley, "Programming Your Home - Automate with Arduino, Android and Your Computer", Pragmatic Programmers, LLC, 2012.
3. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2011.
4. Kevin P. Murphy, "Machine Learning - a Probabilistic Perspective", The MIT Press, Cambridge, Massachusetts, London, 2012.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	-	-
CO2	3	2	3	-	-
CO3	3	2	3	-	-
CO4	3	2	3	-	-
CO5	3	2	3	-	-

1 - Low, 2 - Medium, 3 - High


Chairman (BoS)



CU24001	PRINCIPLES OF MULTIMEDIA	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Students should be familiar with networking and compression techniques.							
OBJECTIVES: This course introduces the fundamentals and importance of multimedia. It covers key multimedia elements and the use of tools and authoring techniques to create interactive content. Students will learn to develop, test and deploy multimedia applications for both web and mobile platforms using relevant technologies.							
UNIT - I	INTRODUCTION					(9)	
Introduction to Multimedia – Characteristics of Multimedia Presentation – Multimedia Components – Promotion of Multimedia Based Components – Digital Representation – Media and Data Streams – Multimedia Architecture – Multimedia Documents, Multimedia Tasks and Concerns, Production, Sharing and distribution, Hypermedia, WWW and Internet, Authoring, Multimedia over wireless and mobile networks.							
UNIT - II	ELEMENTS OF MULTIMEDIA					(9)	
Text-Types, Font, Unicode Standard, File Formats, Graphics and Image data representations – Data types, file formats, color models, video – Color models in video, analog video, digital video, file formats, video display interfaces, 3D video and TV: Audio – Digitization, SNR, SQNR, quantization, audio quality, file formats - MIDI: Animation- Key Frames and Tweening - 2D and 3D Animation.							
UNIT - III	MULTIMEDIA TOOLS					(9)	
Authoring Tools – Features and Types – Card and Page Based Tools – Icon and Object Based Tools – Time Based Tools – Cross Platform Authoring Tools – Editing Tools – Painting and Drawing Tools – 3D Modeling and Animation Tools – Image Editing Tools – Sound Editing Tools – Digital Movie Tools.							
UNIT - IV	MULTIMEDIA SYSTEMS					(9)	
Compression Types and Techniques: CODEC, Text Compression: GIF Coding Standards, JPEG standard – JPEG 2000, Basic audio compression – ADPCM, MPEG Psychoacoustics, Basic Video compression techniques – MPEG, H.26X – Multimedia Database System – User Interfaces – OS Multimedia Support – Hardware Support – Real Time Protocols – Play Back Architectures – Synchronization – Document Architecture – Hypermedia Concepts: Hypermedia Design – Digital Copyrights, Content analysis.							
UNIT - V	MULTIMEDIA APPLICATIONS FOR THE WEB AND MOBILE PLATFORMS					(9)	
ADDIE Model – Conceptualization – Content Collection – Storyboard–Script Authoring Metaphors – Testing – Report Writing – Documentation. Multimedia for the web and mobile platforms. Virtual Reality, Internet multimedia content distribution, Multimedia Information sharing – Social media sharing, cloud computing for multimedia services, interactive cloud gaming. Multimedia information retrieval.							
TOTAL(T:45, SL:45) : 90 PERIODS							
COURSE OUTCOMES: At the end of the course, the learners will be able to:							
COs	Course Outcome					Cognitive Level	
CO1	Explore multimedia components, architecture, and data streams by constructing basic multimedia documents.					Understand	
CO2	Describe the multimedia elements to select appropriate models, formats, and standards for integrating content into multimedia applications.					Understand	

C. Gunk
Chairman (BoS)



CO3	Use multimedia authoring and editing tools to develop interactive multimedia content across different platforms.	Apply
CO4	Implement multimedia compression techniques and synchronization protocols to manage multimedia storage, retrieval and playback systems efficiently.	Apply
CO5	Develop ADDIE model and relevant frameworks to conceptualize and deploy multimedia content for web and mobile platforms.	Apply

REFERENCES:

1. Li, Ze-Nian, Drew, Mark, Liu, Jiangchuan, "Fundamentals of Multimedia", Springer, Germany, Third Edition, 2021.
2. Prabhat K. Andleigh, Kiran Thakrar, "Multimedia Systems Design", Pearson Education, London, First Edition 2015.
3. Gerald Friedland, Ramesh Jain, "Multimedia Computing", Cambridge University Press, United Kingdom, First Edition 2018.
4. Ranjan Parekh, "Principles of Multimedia", McGraw-Hill Education, New York, Second Edition, 2017.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	3	-
CO2	3	-	3	3	-
CO3	3	-	3	3	-
CO4	3	-	3	3	-
CO5	3	-	3	3	-

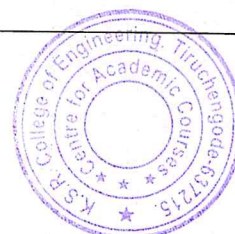
1 - Low, 2 - Medium, 3 - High

C. Guntf
Chairman (BoS)



CU24002	IoT FOR SMART SYSTEMS	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: A solid understanding of basic of Micro Controllers and Sensors and Real Time IoT development Tools.							
OBJECTIVES: This course provides a foundational understanding of the Internet of Things (IoT), including its core concepts and architectures. It familiarizes students with various communication protocols, networking models, and IoT implementation tools. The course also explores diverse real-world applications of IoT across multiple domains.							
UNIT - I	INTRODUCTION TO INTERNET OF THINGS						(9)
Overview, Hardware and software requirements for IOT– Sensor and actuators – Technology drivers, Business drivers, Typical IoT applications – Trends and implications.							
UNIT - II	IOT ARCHITECTURE						(9)
IoT reference model and architecture – Node Structure – Sensing, Processing, Communication, Powering, Networking – Topologies, Layer/Stack architecture, IoT standards, Cloud computing for IoT, Bluetooth, Bluetooth Low Energy beacons.							
UNIT - III	PROTOCOLS AND WIRELESS TECHNOLOGIES FOR IOT						(9)
NFC, SCADA and RFID, Zigbee MIPI, M-PHY, UniPro, SPMI, SPI, M-PCIe, GSM, CDMA, LTE, GPRS, small cell. Wireless technologies for IoT: WiFi (IEEE 802.11) – Bluetooth/Bluetooth Smart, ZigBee/ZigBee Smart, UWB (IEEE 802.15.4), 6LoWPAN, Proprietary systems – Recent trends.							
UNIT - IV	IoT PROCESSORS						(9)
Services/Attributes: Big-Data Analytics for IoT – Dependability – Interoperability – Security, Maintainability. Embedded processors for IoT: Introduction to Python programming – Building IoT with RASPBERRY PI and Arduino.							
UNIT - V	CASE STUDIES						(9)
Industrial IoT – Home Automation – Smart cities, Smart Grid connected vehicles – Electric vehicle charging, Environment, Agriculture – Productivity Applications – IoT Defense							
TOTAL (L:45, SL:45) : 90 PERIODS							
COURSE OUTCOMES: At the end of the course, the learners will be able to:							
COs	Course Outcome						Cognitive Level
CO1	Articulate the main concepts, key technologies, strength and limitations of IoT.						Understand
CO2	Identify the architecture, infrastructure models of IoT						Understand
CO3	Analyze the networking and Protocols are used for communication in IoT						Analyze
CO4	Analyze and design different models for IoT implementation through various IoT Processors.						Analyze
CO5	Identify and design the new models for market strategic interaction						Apply
REFERENCES: 1. Arshdeep Bahga, Vijai Madisetti: A Hands-on Approach: Internet of Things, Universities Press, 2015.							

C. Gururaj
Chairman (BoS)



2. Oliver Hersent, David Boswarthick, Omar Elloumi, the Internet of Things, Wiley, 2016.
3. Samuel Greengard, The Internet of Things, The MIT press, 2015
4. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2014.
5. Jean-Philippe Vasseur, Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Morgan Kuffmann Publishers, 2010.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	3	-
CO2	3	-	3	3	-
CO3	3	-	3	3	-
CO4	3	-	3	3	-
CO5	3	-	3	3	-

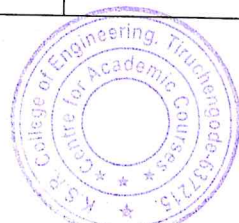
1 - Low, 2 - Medium, 3 - High

C. Gunt
Chairman (BoS)



CU24O03	MEMS AND NEMS	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Engineering Physics- I & II , Engineering Chemistry - I & II							
OBJECTIVES: This course introduces learners to micro and nanoscale systems, materials, and the fundamental principles of MEMS and NEMS. It covers microsystem fabrication processes, the design and operation of MEMS sensors and actuators using various actuation techniques.							
UNIT - I	OVERVIEW AND INTRODUCTION						(9)
New trends in Engineering and Science: Micro and Nanoscale systems Introduction to Design of MEMS and NEMS, Overview of Nano and Microelectromechanical Systems, Applications of Micro and Nano electro-mechanical systems, Microelectromechanical systems, devices and structures Definitions, Materials for MEMS: Silicon, silicon compounds, polymers, metals.							
UNIT - II	MEMS FABRICATION TECHNOLOGIES						(9)
Microsystem fabrication processes: Photolithography, Ion Implantation, Diffusion, Oxidation. Thin film depositions: LPCVD, Sputtering, Evaporation, Electroplating; Etching techniques: Dry and wet etching, electrochemical etching; Micromachining: Bulk Micromachining, Surface Micromachining, High Aspect-Ratio (LIGA and LIGA-like) Technology; Packaging: Microsystems packaging, Essential packaging technologies, Selection of packaging materials.							
UNIT - III	MICROSENSORS						(9)
MEMS Sensors: Design of Acoustic wave sensors, resonant sensors, Vibratory gyroscope, Capacitive and Piezo Resistive Pressure sensors- engineering mechanics behind these Microsensors. Case study: Piezo-resistive pressure sensor							
UNIT - IV	MICRO ACTUATORS						(9)
Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces (Parallel plate, Torsion bar, Comb drive actuators), Micromechanical Motors and pumps. Case study: Comb drive actuators							
UNIT - V	NANOSYSTEMS AND QUANTUM MECHANICS						(9)
Atomic Structures and Quantum Mechanics, Molecular and Nanostructure Dynamics: Schrodinger Equation and Wave function Theory, Density Functional Theory, Nanostructures and Molecular Dynamics, Electromagnetic Fields and their Quantization, Molecular Wires and Molecular Circuits.							
TOTAL (L:45, SL:45) : 45 PERIODS							
COURSE OUTCOMES: At the end of the course, the learners will be able to:							
COs	Course Outcome						Cognitive Level
CO1	Explain the fundamentals of micro and nanoscale systems, including MEMS/NEMS design concepts.						Understand
CO2	Describe various microsystem fabrication techniques such as photolithography, thin-film deposition and micromachining processes.						Understand
CO3	Illustrate the structure, function, and engineering principles of MEMS sensors like acoustic wave, resonant, gyroscopic, capacitive and piezo resistive sensors.						Understand

C. Gunk
Chairman (BOS)



CO4	Summarize different actuation mechanisms in micro actuators, including thermal, piezoelectric, electrostatic and shape memory alloy-based designs.	Understand
CO5	Discuss key concepts of quantum mechanics and Nano system behavior, including molecular dynamics and wave function theory.	Understand

TEXTBOOKS:

1. Tai Ran Hsu, "MEMS and Microsystems Design and Manufacture", First edition, Tata McGraw-Hill, India, 2002.
2. Stephen D. Senturia," Microsystem Design", Second edition, Springer, India, 2004.
3. M.J. Madou, "Fundamentals of Micro Fabrication", CRC Press, New Delhi, Second edition, 2002
4. Chang Liu, "Foundations of MEMS", Second edition, Pearson Education Limited, India, 2006

Mapping of COs with POs and PSOs					
COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	-	2	2	-	3
CO2	-	2	2	-	3
CO3	-	2	2	-	3
CO4	-	3	3	-	3
CO5	-	3	3	-	3

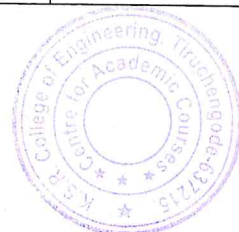
1 - Low, 2 - Medium, 3 - High

C. Guntur
Chairman (BoS)



CU24004	INTRODUCTION TO COGNITIVE RADIO NETWORK	Category	L	T	P	SL	C
		OEC	45	0	0	45	3
PREREQUISITE: Digital Communication.							
OBJECTIVES: This course introduces students to cognitive radio networks, focusing on their architecture and importance in efficient spectrum utilization. It covers spectrum sensing techniques, dynamic spectrum allocation using optimization methods, and various access models.							
UNIT - I	INTRODUCTION TO COGNITIVE RADIO					(9)	
Introduction to Cognitive Radios: Digital dividend, cognitive radio (CR) architecture, functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.							
UNIT - II	SPECTRUM SENSING					(9)	
Spectrum Sensing: Spectrum sensing, detection of spectrum holes (TVWS), collaborative sensing, geo-location database and spectrum sharing business models.							
UNIT - III	OPTIMIZATION TECHNIQUES					(9)	
Optimization Techniques of Dynamic Spectrum Allocation: Linear programming, convex programming, non-linear programming, integer programming, dynamic programming, stochastic programming.							
UNIT - IV	DYNAMIC SPECTRUM					(9)	
Dynamic Spectrum Access and Management: Spectrum broker, cognitive radio architectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.							
UNIT - V	SPECTRUM TRADING AND RESEARCH CHALLENGES					(9)	
Spectrum Trading: Introduction to spectrum trading, classification to spectrum trading, radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), classification of auctions (single auctions, double auctions, concurrent, sequential). Research Challenges in Cognitive Radio: Network layer and transport layer issues, cross layer design for cognitive radio networks.							
TOTAL (L:45, SL:45): 90 PERIODS							
COURSE OUTCOMES: At the end of the course, the learners will be able to:							
COs	Course Outcome					Cognitive Level	
CO1	Demonstrate knowledge of cognitive radio architecture, functions, and applications.					Understand	
CO2	Analyze and apply spectrum sensing techniques for detecting spectrum holes and managing shared resources.					Analyse	
CO3	Solve dynamic spectrum allocation problems using mathematical optimization techniques.					Apply	
CO4	Compare and contrast centralized and distributed spectrum access strategies and their real-world applications.					Apply	
CO5	Identify and propose solutions for key research challenges in cognitive radio networks.					Understand	

C. Guntf
Chairman (BoS)



REFERENCES:

1. Cognitive Radio, Software Defined Radio and Adaptive Wireless Systems", Hüseyin Arslan, Springer, ISBN 978-1-4020-5541-6 (HB), 2007.
2. Kwang-Cheng Chen, Ramjee Prasad, Cognitive radio networks, John Wiley & Sons Ltd., New York, 2009
3. Bruce Fette, Cognitive radio technology, Elsevier, Second edition, 2009.
4. Hüseyin Arslan, Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Springer, 2007.
5. Francisco Rodrigo Porto Cavalcanti, Soren Anderson, Optimizing Wireless Communication Systems, Springer, 2009.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	3	-
CO2	3	-	3	3	-
CO3	3	-	3	3	-
CO4	3	-	3	3	-
CO5	3	-	3	3	-

1 - Low, 2 - Medium, 3 - High

C. Guntf
Chairman (BoS)

