SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE
(Autonomous)
Gobichettipalayam, Erode-638455

Regulation 2023 (Autonomous)

Curriculum and Syllabus

Choice Based Credit System (CBCS)

ME – CONSTRUCTION ENGINEERING AND MANAGEMENT

	SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE (Autonomous) Gobichettipalayam, Erode -638455
Regulation 2023 (PG)	
Curriculum and Syllabus	
M.E.CONSTRUCTION ENGINEERING AND MANAGEMENT	

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates of the programme M E Construction Engineering & Management will

PEO1: **Research Excellence:** Excel in research or will succeed in Construction Engineering and Management profession in the government, public and private sector organizations.

PEO2: **Modern Tools:** Have a sound knowledge in statistics, project management and construction engineering fundamentals required for solving real time construction Engineering and Management problems using modern equipment and software tools.

PEO3: **Multidisciplinary Solutions:** Become entrepreneurs and develop processes and construction technologies through innovation, by integrating their knowledge in multidisciplinary management to meet the needs of society and formulate solutions that are technically sound, economically feasible, and socially acceptable.

PEO4 : **Ethics:** Have professional and ethical attitude, effective communication skills, teamwork skills, leadership quality, multidisciplinary approach and an ability to relate Construction Engineering and Management issues in broader social context.

PEO5: **Life-Long Learning:** Have competence of excellence, leadership, written ethical codes and guidelines, and the life-long learning needed for a successful professional career.

2. PROGRAMME OUTCOMES (POs):

The students will able to

PO1: **Problem Solving:** An ability to independently carry out research/investigation and development work to solve practical problems.

PO2: **Report Writing:** An ability to write and present a substantial technical report/document.

PO3: **Mastery in specialization:** 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

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3. **PROGRAM SPECIFIC OUTCOMES (PSOs):**

Graduates of the program M.E. Construction Engineering and Management will be able to

PSO1 **Knowledge of Construction Engineering and Management discipline**

In-depth knowledge in the construction management, engineering and technologies necessary to formulate, plan, schedule and execute construction projects.

PSO2 **Critical analysis of Construction management problems and innovation**

Critically analyze and solve construction engineering and management problems by applying the modern tools and concepts of Construction Engineering & Management and make innovative advances in theoretical and practical.

PSO3 **Conceptualization and evaluation of engineering solutions to Construction Issues**

Conceptualize the problems in construction industry and develop appropriate solutions which are technically feasible and economically viable with due consideration of sustainability.

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Mapping of Course Outcomes and Programme Outcomes

Year	Sem	Course name	PO			PSO		
			1	2	3	1	2	3
I	I	Statistical Methods for Engineers	1.6	0.8	2.6	-	-	-
		Modern Construction Materials	3	1	2	2	1	3
		Project Formulation and Appraisal	2	1	3	3	1	2
		Construction Equipment and Management	3	1	2	3	2	3
		Professional Elective I	-	-	-	-	-	-
		Research Methodology and IPR	-	-	-	-	-	-
		Audit Course – I	-	-	-	-	-	-
		Advanced Construction Engineering and Experimental Techniques Laboratory	2	2	3	3	1	2
		Technical Seminar	2	3	2	3	2	3
	II	Advanced Construction Techniques	3	1	3	3	2	3
		Construction Planning, Scheduling and Control	3	1	3	3	2	3
		Contract Laws and Regulations	2	1	3	3	3	2
		Professional Elective II	-	-	-	-	-	-
		Professional Elective III	-	-	-	-	-	-
		Audit Course –II	-	-	-	-	-	-
		Construction Management Studio Laboratory	2	2	3	3	3	3
		Statistical Analysis for Construction Engineers Laboratory	3	3	3	3	3	3
II	III	Professional Elective IV	-	-	-	-	-	-
		Professional Elective V	-	-	-	-	-	-
		Open Elective	-	-	-	-	-	-
		Practical Training (4 weeks)	3	3	3	3	2	2
		Project Work I	3	3	3	3	3	3
	IV	Project Work II	3	3	3	3	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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PROFESSIONAL ELECTIVE COURSES (PEC)

S. NO.	COURSE TITLE	PO1	PO2	PO3	PSO1	PSO2	PSO3
1.	Advanced Concrete Technology	3	1	3	2	2	2
2.	Human Resources Management in Construction	2	1	3	3	3	3
3.	Construction Project Management	3	1	3	3	2	2
4.	Sustainable Construction	3	1	3	2	3	2
5.	Economics and Finance Management in Construction	3	1	3	3	3	1
6.	Design of Energy Efficient Buildings	3	1	3	3	2	3
7.	Project Safety Management	3	2	3	2	1	2
8.	Computer Applications in Construction Engineering and Planning	3	1	3	2	2	2
9.	Quantitative Techniques in Management	3	1	3	3	1	1
10.	Resource Management and Control in Construction	3	1	3	3	2	2
11.	Shoring, Scaffolding and Formwork	3	1	3	2	1	1
12.	System Integration in Construction	3	1	3	3	2	3
13.	Advanced Data Analysis	3	1	3	3	2	3
14.	Lean Construction Concepts, Tools & Practices	3	1	3	3	2	2
15.	Environmental Impact Assessment For Construction Engineers	3	2	3	3	2	3
16.	Maintenance, Repair and Rehabilitation of Structures	3	1	3	2	2	1
17.	Quality control and assurance in construction	3	1	3	3	2	2
18.	Organizational Behaviour	3	1	3	2	3	2
19.	Digital Design and Construction	3	1	3	3	2	3
20.	Supply chain management and Logistics in construction	3	1	3	3	2	3

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Summary of Credits

SL. No	Category	Credit Points/Semester				Total Credits	Credits in %
		I	II	III	IV		
1.	FC	04	00	00	00	04	5.71
2.	PC	12	13	00	00	25	35.71
3.	PE	03	06	06	00	15	21.43
4.	RM	02	00	00	00	02	2.86
5.	OE	00	00	03	00	03	4.29
6.	EEC	01	00	08	12	21	30.00
7.	Non Credit/ Audit Course	√	√	00	00		
Total		22	19	17	12	70	100

CATEGORIZATION OF COURSES

i. Foundation Courses (FC)
ii. Professional Core Courses (PC)
iii. Professional Elective Courses (PE)
iv. Research Methodology and IPR Courses (RM)
v. Open Electives Courses (OE)
vi. Employability Enhancement Courses (EEC)
vii. Audit Courses (AC)

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Curriculum and Syllabus

M.E.CONSTRUCTION ENGINEERING AND MANAGEMENT

Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM
SEMESTER I										
THEORY										
1	23CMT11	Statistical Methods for Engineers	FC	4	0	0	4	40	60	100
2	23CMT12	Modern Construction Materials	PC	3	0	0	3	40	60	100
3	23CMT13	Project Formulation and Appraisal	PC	3	1	0	4	40	60	100
4	23CMT14	Construction Equipment and Management	PC	3	0	0	3	40	60	100
5	23RMT11	Research Methodology and IPR	RM	2	0	0	2	40	60	100
6		Professional Elective I*	PE	3	0	0	3	40	60	100
7		Audit Course I#	AC	2	0	0	0	100	-	100
PRACTICALS										
8	23CML11	Advanced Construction Engineering and Experimental Techniques Laboratory	PC	0	0	4	2	60	40	100
9	23CML12	Technical Seminar	EEC	0	0	2	1	100	-	100
Total Credits in Semester I				20	1	6	22			

*** Professional Elective – I shall be chosen from the list of Professional electives I offered by same Programme**

 # Audit Course is optional

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M.E.CONSTRUCTION ENGINEERING AND MANAGEMENT

Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM
SEMESTER II										
THEORY										
1	23CMT21	Advanced Construction Techniques	PC	3	0	0	3	40	60	100
2	23CMT22	Construction Planning, Scheduling and Control	PC	3	0	0	3	40	60	100
3	23CMT23	Contract Laws and Regulations	PC	3	0	0	3	40	60	100
4		Professional Elective II *	PE	3	0	0	3	40	60	100
5		Professional Elective III *	PE	3	0	0	3	40	60	100
6		Audit Course II#	AC	2	0	0	0	100	-	100
PRACTICALS										
7	23CML21	Construction Management Studio Laboratory	PC	0	0	4	2	60	40	100
8	23CML22	Statistical Analysis for Construction Engineers Laboratory	PC	0	0	4	2	60	40	100
Total Credits in Semester II				17	0	8	19			

*** Professional Elective – II & III shall be chosen from the list of Professional electives II & III offered by same Programme**

 # Audit Course is optional

@ The students individually undergo training in reputed firms/ research institutes / laboratories for the specified duration (04 Weeks) at summer vacation. After the completion of training, a detailed report should be submitted within ten days from the commencement of next semester.

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M.E.CONSTRUCTION ENGINEERING AND MANAGEMENT

Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM
SEMESTER III										
THEORY										
1		Professional Elective IV*	PE	3	0	0	3	40	60	100
2		Professional Elective V*	PE	3	0	0	3	40	60	100
3		Open Elective**	OE	3	0	0	3	40	60	100
PRACTICALS										
4	23CML31	Practical Training (4 Weeks)@	EEC	0	0	0	2	100	-	100
5	23CML32	Project Work I	EEC	0	0	12	6	40	60	100
Total Credits in Semester III				9	0	12	17			

*** Professional Elective – IV & V shall be chosen from the list of Professional electives IV & V offered by same Programme**

****Open Elective shall be chosen from the list of open electives offered by other Programmes**

@ The students undergone summer internship during II semester summer vacation and same will be evaluated in III semester.

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Sl. No	Course Code	Course Title	Category	Periods /Week			Credits	Max. Marks		
				L	T	P		CA	ES	TM
SEMESTER IV										
PRACTICALS										
1	23CML41	Project Work II	EEC	0	0	24	12	40	60	100
Total Credits in Semester IV				0	0	24	12			

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LIST OF PROFESSIONAL ELECTIVE COURSES [PE]

SEMESTER I, ELECTIVE I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CME11	Advanced Concrete Technology	PE	3	0	0	3	3	40	60	100
2.	23CME12	Human Resources Management in Construction	PE	3	0	0	3	3	40	60	100
3.	23CME13	Construction Project Management	PE	3	0	0	3	3	40	60	100
4.	23CME14	Sustainable Construction	PE	3	0	0	3	3	40	60	100

SEMESTER II, ELECTIVE II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max. Marks		
				L	T	P			CA	ES	TM
1.	23CME21	Economics and Finance Management in Construction	PE	3	0	0	3	3	40	60	100
2.	23CME22	Design of Energy Efficient Buildings	PE	3	0	0	3	3	40	60	100
3.	23CME23	Project Safety Management	PE	3	0	0	3	3	40	60	100
4.	23CME24	Computer Applications in Construction Engineering and Planning	PE	3	0	0	3	3	40	60	100

SEMESTER II, ELECTIVE III

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max. Marks		
				L	T	P			CA	ES	TM
1.	23CME25	Quantitative Techniques in Management	PE	3	0	0	3	3	40	60	100
2.	23CME26	Resource Management and Control in Construction	PE	3	0	0	3	3	40	60	100
3.	23CME27	Shoring, Scaffolding and Formwork	PE	3	0	0	3	3	40	60	100
4.	23CME28	System Integration in Construction	PE	3	0	0	3	3	40	60	100

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SEMESTER III, ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CME31	Advanced Data Analysis	PE	3	0	0	3	3	40	60	100
2.	23CME32	Environmental Impact Assessment For Construction Engineers	PE	3	0	0	3	3	40	60	100
3.	23CME33	Lean Construction Concepts, Tools and Practices	PE	3	0	0	3	3	40	60	100
4.	23CME34	Maintenance, Repair and Rehabilitation of Structures	PE	3	0	0	3	3	40	60	100

SEMESTER III, ELECTIVE V

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CME35	Quality Control and Assurance in Construction	PE	3	0	0	3	3	40	60	100
2.	23CME36	Digital Design and Construction	PE	3	0	0	3	3	40	60	100
3.	23CME37	Organizational Behaviour	PE	3	0	0	3	3	40	60	100
4.	23CME38	Supply Chain Management and Logistics in Construction	PE	3	0	0	3	3	40	60	100

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			SEMESTER	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23ENA11	English for Research Paper Writing	AC	2	0	0	1/2	0	100	-	100
2.	23CMA12	DISASTER ADMINISTRATION AND MANAGEMENT	AC	2	0	0		0	100	-	100
3.	23MSA13	Constitution of India	AC	2	0	0		0	100	-	100
4.	23TAA14	நற்றமிழ் இலக்கியம்	AC	2	0	0		0	100	-	100

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LIST OF OPEN ELECTIVES COURSES (OE)

SEMESTER III, OPEN ELECTIVE – OFFERED BY CIVIL ENGINEERING

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CM011	Sustainable Construction	OE	3	0	0	3	3	40	60	100
2.	23CM012	Project Safety Management	OE	3	0	0	3	3	40	60	100
3.	23SE011	Prefabricated structures	OE	3	0	0	3	3	40	60	100
4.	23SE012	Maintenance Repair and Rehabilitation Of Structure	OE	3	0	0	3	3	40	60	100

LIST OF OPEN ELECTIVES COURSES (OE)

SEMESTER III, OPEN ELECTIVE - – OFFERED BY MANAGEMENT STUDIES

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MS031	Sustainable Management	OE	3	0	0	3	3	40	60	100
2.	23MS032	Micro and Small Business Management	OE	3	0	0	3	3	40	60	100
3.	23MS033	Intellectual Property Rights	OE	3	0	0	3	3	40	60	100
4.	23MS034	Ethical Management	OE	3	0	0	3	3	40	60	100

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23CMT11	STATISTICAL METHODS FOR ENGINEERS (for M.E. Construction Engineering and Management)	L 4	T 0	P 0	C 4

COURSE OBJECTIVES:

- This course is designed to provide the solid foundation on topics in various statistical methods which form the basis for many other areas in the mathematical sciences including statistics, modern optimization methods and risk modeling. It is framed to address the issues and the principles of estimation theory, testing of hypothesis, correlation and regression, design of experiments and multivariate analysis.

UNIT-I **ESTIMATION THEORY** **12**

Estimators : Unbiasedness, Consistency, Ef iciency and suf iciency – Maximum likelihood estimation – Method of moments.

UNIT-II **TESTING OF HYPOTHESIS** **12**

Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of it.

UNIT-III **DESIGN OF EXPERIMENTS** **12**

Analysis of variance – One way and two way classi ications – Completely randomized design – Randomized block design – Latin square design - 2^2 Factorial design – 2^K - Factorial design.

UNIT-IV **CORRELATION AND REGRESSION** **12**

Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coef icient of multiple correlation – Coef icient of partial correlation – Multiple correlation with total and partial correlations – Regression and partial correlations in terms of lower order co - ef icient.

UNIT-V **MULTIVARIATE ANALYSIS** **12**

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components: Population principal components – Principal components from standardized variables.

TOTAL : 60 PERIODS

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COURSE OUTCOMES:

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

CO1 : Consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation and Central Limit Theorem

CO2 : Use statistical tests in testing hypotheses on data.

CO3 : List the guidelines for designing experiments and recognize the key historical figures in Design of Experiments

CO4 : Concept of linear regression, correlation, and its applications

CO5 : Perform exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.

REFERENCE BOOKS:

1. Gupta.S.C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics", 12th Edition, Sultan Chand and Sons, 2020.
2. Jay L. Devore, "Probability and statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, 2014.
3. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", 9th Edition, Pearson Education, Asia, 2016.
4. Johnson, R.A. and Wichern, D. W. "Applied Multivariate Statistical Analysis", 6th Edition, Pearson Education, Asia, 2012.
5. Rice, J.A. "Mathematical Statistics and Data Analysis", 3rd Edition, Cengage Learning,2015.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/111/105/111105077/
2. https://nptel.ac.in/courses/105105150

CO's - PO's MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-
AVG	2	1	3	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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		L	T	P	C
23CMT12	**MODERN CONSTRUCTION MATERIALS**	3	0	0	3

Course Objectives:

- To study and understand the properties of modern construction materials used in construction such as special concretes, metals, composites, water proofing compounds, non-weathering materials, and smart materials.

UNIT-I STRUCTURAL MATERIALS 9

Wood and Wood Product - Metals - 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-II NON-STRUCTURAL MATERIALS, ASSOCESSORIES AND FINISHES 9

Introduction of Non-Structural Materials and Criteria for Selection - Types and properties of Water Proofing Materials – Types of Non-weathering Materials and its uses – Types of Polymer Floor Finishes - Paint - Tiles - Acoustic Treatment materials - Dry Walls - Anchors.

UNIT-III COMPOSITES 9

Types of Plastics – Polymer - Properties & Manufacturing process – Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP - Bituminous Materials - Glass - Closure - Environmental Concerns

UNIT-IV SPECIAL CONCRETES 9

Concretes - Behavior of concretes – Properties and Advantages of High Strength and High Performance Concrete – Properties and Applications of Fibre Reinforced Concrete, Self-compacting concrete, Geo Polymer Concrete, Alternate Materials to concrete on high performance & high Strength concrete.

UNIT-V SMART AND INTELLIGENT MATERIALS 9

Types & Differences between Smart and Intelligent Materials – Special features – Nano Concrete - Nano Technology in Construction - Case studies showing the applications of smart & Intelligent Materials.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Explain the various types of special concretes
CO2	Select the different processing of steel and applications of coating
CO3	Explain the manufacturing process and applications of polymer composites
CO4	Identify the different flooring materials and application of façade materials
CO5	Apply the knowledge of smart and intelligent materials in construction field

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	3
CO2	3	1	2	2	2	3
CO3	3	1	3	1	1	3
CO4	2	1	2	2	1	1
CO5	3	1	3	1	1	1

Reference Books:

1. N.Subramanian ,"Building Materials Testing and Sustainability", Oxford Higher Education, 2019.
2. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand & Company Ltd., 2019 .
3. Ganapathy, C. "Modern Construction Materials", Eswar Press, 2015.
4. SanthakumarA.R. "Concrete Technology", Oxford University press, New Delhi, 2006.
5. Ashby, M.F. and Jones D.R.H.H. "Engineering Materials 1: An introduction to Properties, applications and designs", Elsevier Publications, 2005.

Online sources:

https://archive.nptel.ac.in/courses/105/106/105106053/
https://nptel.ac.in/courses/105106053
https://nptel.ac.in/courses/105106200

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23CMT13	PROJECT FORMULATION AND APPRAISAL	L	T	P	C
		3	1	0	4

Course Objectives:

- To study and understand the formulation, and costing of construction projects, appraisal, finance, and private sector participation.

UNIT-I PROJECT FORMULATION 12

Project – 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 12

Project Cash Flows – Principles – Types – New Project and Replacement Project – Biases in Cash flow Estimation – Time Value of Money – Present Value – Future Value – Single amount - Annuity – Cost of Capital – Cost of Debt, Preference, Equity – Proportions - Cost of Capital Calculation – Financial Institutions Considerations.

UNIT-III PROJECT APPRAISAL 12

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 12

Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators – Ratios – financial cost-benefit analysis, social-cost benefit analysis.

UNIT-V PRIVATE SECTOR PARTICIPATION 12

Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT-Technology Transfer and Foreign Collaboration - Scope of Technology Transfer.

Total Hours 60

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Perform Formulations Of Projects
CO2	Analyze Project Costing
CO3	Evaluate Project Appraisal
CO4	Apply Project Financing
CO5	Perform Private Sector Participation & Implementation

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	3	3	1	2
CO2	3	2	3	3	1	3
CO3	3	3	3	3	2	2
CO4	3	2	3	3	1	3
CO5	3	1	2	3	2	2

Reference Books:

1. Barcus, S.W. and Wilkinson.J.W., Hand Book of Management Consulting Services, McGraw Hill, New York, first edition, 1995.
2. Joy P.K., Total Project Management - The Indian Context, New Delhi, Laxmi Publications Pvt. Ltd, First edition 2017.
3. Prasanna Chandra., Projects – Planning, Analysis, Selection, Implementation Review, McGraw Hill Publishing Company Ltd., New Delhi., Ninth edition, 2019.
4. United Nations Industrial Development Organisation (UNIDO) Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1995.
5. Raina V.K, "Construction Management Practice – The inside Story", Tata McGraw Hill Publishing Limited, 2005

Online sources:

https://nptel.ac.in/courses/112102107
http://www.infocobuild.com/education/audio-video-courses/mechanical engineering/ProjectProductionManagement-IIT-Delhi/lecture-04.html
https://archive.nptel.ac.in/courses/110/104/110104073/

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		L	T	P	C
23CMT14	**CONSTRUCTION EQUIPMENT AND MANAGEMENT**	3	0	0	3

Course Objectives:

- To study and understand the various types of equipments used for earthwork, tunneling, drilling, blasting, dewatering, material handling conveyors and its applications in construction projects

UNIT-I CONSTRUCTION EQUIPMENT SELECTION 9

Identification – Planning of equipment – Selection of Equipment - Equipment Management in Projects - Maintenance Management – Equipment cost – Operating cost – Cost Control of Equipment - Depreciation Analysis – Replacement of Equipment- Replacement Analysis - Safety Management.

UNIT-II EQUIPMENT FOR EARTHWORK 9

Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders – Dozer, Excavators, Rippers, Loaders, trucks and hauling equipment, Compacting Equipment, Finishing equipment.

UNIT-III OTHER CONSTRUCTION EQUIPMENT 9

Equipment for Dredging, Trenching, Drag line and clamshells, Tunneling – Equipment for Drilling and Blasting - Pile driving Equipment - Erection Equipment - Crane, Mobile crane - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Equipment for Demolition.

UNIT-IV ASPHALT AND CONCRETING EQUIPMENT 9

Aggregate production- Different Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Pumping Equipment – Ready mix concrete equipment, Concrete pouring equipment. Asphalt Plant, Asphalt Pavers, Asphalt compacting Equipment.

UNIT-V MATERIALS HANDLING EQUIPMENT 9

Forklifts and related equipment - Portable Material Bins – Material Handling Conveyors – Material Handling Cranes- Industrial Trucks.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Develop knowledge on the planning of equipment and selection of equipment
CO2	Explain the knowledge on fundamentals of earth work operations, earth moving operations and types of earth work equipment
CO3	Develop the knowledge on special construction equipments
CO4	Apply the knowledge on asphalt and concrete plants
CO5	Apply the knowledge and select the proper materials handling equipment

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	2
CO2	3	1	2	3	2	3
CO3	3	1	3	3	2	3
CO4	3	1	3	3	2	3
CO5	3	1	3	3	2	3

Reference Books:

1. Peurifoy, R.L., Schexnayder, C. and AviadShapira., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 2010.
2. Granberg G.,Popescu M Construction Equipment and Management for Engineers Estimators and Owners, Taylor and Francis Publishers, New York, 2006
3. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 2001.
4. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, DhanpatRai and Sons, 2010.
5. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 2019

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23RMT11	RESEARCH METHODOLOGY AND IPR	L	T	P	C
		2	0	0	2

Course Objectives:

- To impart knowledge on formulation of research problem, research methodology, ethics involved in doing research and importance of IPR protection.

UNIT-I **RESEARCH DESIGN** **6**

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** **6**

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying

UNIT-III **DATA ANALYSIS AND REPORTING** **6**

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** **6**

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, 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-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

Total Hours **30**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Formulate research problem.
CO2	Analyze literature review and find research gaps to finalize research objectives.
CO3	Identify the need of ethics in research.
CO4	Identify the need of IPR of research projects for economic growth and social benefits
CO5	Publish/Patent research outcome.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	2
CO2	3	1	1	2	2	2
CO3	3	1	1	2	2	2
CO4	3	1	1	2	2	2
CO5	3	1	1	2	2	2

Reference Books:

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.
3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

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23CML11	ADVANCED CONSTRUCTION ENGINEERING AND EXPERIMENTAL TECHNIQUES LABORATORY	L	T	P	C
		0	0	4	2

A) ADVANCED CONSTRUCTION ENGINEERING LABORATORY

Course Objectives:

- To provide a thorough knowledge of material selection through the material testing based on specification

List of Experiments **30**

1. Mix design of concrete as per IS, ACI & BS methods for high-performance concrete.
2. Flow Characteristics of Self Compacting concrete.
3. Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength, and durability.
4. NDT on hardened concrete - UPV, Rebound hammer, and core test.
5. Permeability test on hardened concrete (RCPT) – Demonstration

Total Hours **30**

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Do the mix proportion using IS and ACI codal provisions
CO2	Analyse the flow characteristics of SCC
CO3	Analyse the effect of mineral and Chemical Admixtures
CO4	Test the concrete in a non-destructive manner using a rebound hammer
CO5	Know the permeability characteristics of concrete.

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B) EXPERIMENTAL TECHNIQUES LABORATORY

Course Objectives:

- To provide a detailed account of modern experimental techniques in construction Engineering research.
- To introduce the basic working principles, the operational know how, and the strength and limitations of the techniques.

List of Experiments **30**

1. Determination of elastic constants – Hyperbolic fringes
2. Determination of elastic constants – Elliptical fringes
3. Strain gauge meter – Determination of Young's modulus of a metallic wire
4. Ultrasonic interferometer – ultrasonic velocity in liquids
5. Electrical conductivity of metals and alloys with temperature-four probe method
6. Resistivity measurements
7. NDT – Ultrasonic flaw detector
8. Calibration of Proving Ring and LVDT

Total Hours **30**

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Apply the experimental methods to correlate with the theory.
CO2	Learn the usage of electrical systems for various measurements
CO3	Learn the usage of optical systems for various measurements.
CO4	Analyse of Data and interpretation
CO5	Apply the analytical techniques and graphical analysis to interpret the experimental data

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CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	2	3	2	1	2
CO2	2	2	3	3	1	2
CO3	2	2	3	3	1	2
CO4	2	2	3	3	2	2
CO5	2	2	3	2	2	2

Reference Books:

1. SVHEC- Advanced Construction Engineering And Experimental Techniques Laboratory Manual

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23CML12	TECHNICAL SEMINAR	L	T	P	C
		0	0	2	1

Course Objectives:

- To work on a specific technical topic in Construction Engineering and Management in order to acquire the skills of oral presentation and to acquire technical writing abilities for seminars and conferences.

SYLLABUS **30**

The students will work for two hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice related to construction engineering and management and to engage in dialogue with the audience. A brief copy of their talk also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic. They will also answer the queries on the topic. The students as audience also should interact. Evaluation will be based on the technical presentation and the report and also on the interaction during the seminar.

Total Hours **30**

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Identify latest developments in the field of Construction Engineering
CO2	Identify latest developments in the field of Construction Management
CO3	Presentation Skills and ability to answer the queries during Interaction
CO4	Acquire technical writing abilities for seminars, conferences and journal publications
CO5	Use modern tools to present the technical details

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3
CO2	2	3	3	3	2	3
CO3	2	3	3	3	2	3
CO4	3	3	3	3	2	3
CO5	3	3	3	3	2	3

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		L	T	P	C
23CMT21	**ADVANCED CONSTRUCTION TECHNIQUES**	3	0	0	3

Course Objectives:

- To study and understand the latest construction techniques applied to engineering construction for sub structure, super structure, and special structures.
- To gain the knowledge about the rehabilitation and strengthening techniques.
- To learn about the various demolition techniques.

UNIT-I SUB STRUCTURE CONSTRUCTION 9

Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunneling 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 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 – Erection techniques of tall structures, Large span structures – launching techniques for heavy decks – in-situ prestressing in high rise structures, Post tensioning of slab- Aerial transporting – Handling and erecting lightweight components on tall structures.

UNIT-III CONSTRUCTION OF SPECIAL STRUCTURES 9

Erection of lattice towers - Rigging of transmission line structures – Construction sequence in cooling towers, Silos, chimney, and sky scrapers - Bow string bridges, Cable stayed bridges – Launching and pushing of box decks – Construction of jetties and break water structures – Construction sequence and methods in domes – Support structure for heavy equipment and machinery in heavy industries – Erection of articulated structures and space decks.

UNIT-IV REHABILITATION AND STRENGTHENING TECHNIQUES 9

Seismic retrofitting - Strengthening of beams, columns, slab and masonry wall - Protection methods of structures, Mud jacking and grouting for foundation – Micro piling and underpinning for strengthening floor and shallow profile - Sub grade water proofing, Soil Stabilization techniques.

UNIT-V DEMOLITION 9

Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Classify the modern construction techniques used in the sub structure construction
CO2	Demonstrate knowledge and understanding of the principles and concepts relevant to super structure construction for buildings
CO3	Summarize the concepts used in the construction of special structures
CO4	Distinguish Various strengthening and repair methods for different cases
CO5	Identify the suitable demolition technique for demolishing a building

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	3
CO2	3	1	3	2	2	2
CO3	3	1	3	3	2	3
CO4	3	1	3	3	2	3
CO5	2	1	3	2	2	2

Reference Books:

1. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 2000.
2. Concrete Structures: Repair, Rehabilitation and Strengthening, Dr. Mohamed A. El-Reedy, 2020
3. Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.
4. Peter H.Emmons, "Concrete repair and maintenance illustrated", Galgotia Publications Pvt. Ltd., 2001.Press, 2008.
5. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University, New Delhi, 2008.

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https://digimat.in/nptel/courses/video/105103206/L01.html

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		L	T	P	C
23CMT22	**CONSTRUCTION PLANNING, SCHEDULING, AND CONTROL**	3	0	0	3

Course Objectives:

- To study and understand the concept of planning.
- To impart concepts in Network representation and analysis.
- To impart concepts in Precedence Network analysis.
- To impart concepts in resource scheduling.
- To learn Concepts in project monitoring and controlling

UNIT-I **CONSTRUCTION PLANNING** **9**

Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks and Work Break down Levels – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems - Planning Project Schedule and Budget

UNIT-II **NETWORK REPRESENTATION AND ANALYSIS** **9**

Duration Estimation – Gantt / Bar Chart – Types of Network and Techniques – Introduction to Floats, Types of Floats, usage of Floats for Project Decisions - Presenting Project Schedules – Scheduling for Activity-on-Node and with Leads, Lags, and Windows – Critical Path Method (CPM) Network Analysis - PERT Network Modeling and Time Analysis - Case Illustrations

UNIT-III **PRECEDENCE NETWORK ANALYSIS** **9**

Introduction to Precedence Diagramming Method (PDM) - PDM network representation, Procedure and Analysis, Issues in PDM, Case Illustrations, Defining Relationship, Project Monitoring and Control Process.

UNIT-IV **SCHEDULING PROJECT WORK AND RESOURCE SCHEDULING** **9**

Work Scheduling Fundamentals – Bar chart method of Work scheduling – Network Based Project Scheduling – Line of Balance Scheduling for Repetitive Projects - Scheduling with Uncertain Durations – Resources Scheduling Considerations – Crashing and Time/Cost Trade-offs- Case Illustrations – Use of Project management Software for scheduling Process.

UNIT-V **PROJECT MONITORING AND CONTROLLING** **9**

The Cost Control Approach – Direct and Indirect Cost Control – Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows - Performance Control using Earned Value Management Concepts – Time progress monitoring and Controlling – Time Reduction Techniques – Guidelines for reviewing project Time and Cost Progress.

Total Hours **45**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Identify and estimate the activity in the construction.
CO2	Schedule the networking of activities using the critical path method
CO3	Evaluate the project budget required for the particular construction project.
CO4	Recognize the various quality control tool required in the construction industry.
CO5	Explain the different databases that can be maintained in the construction industry using computers.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	1	2	1	3	1	3
CO2	2	1	2	3	3	2
CO3	2	2	2	2	3	2
CO4	3	1	3	3	2	3
CO5	3	1	3	2	2	3

Reference Books:

1. Albert Lester, Project Management, Planning and Control, 7th Edition, Butterworth-Heinemann, USA, 2017.
2. Chitkara K K., Construction project management, planning, scheduling and control, McGraw Hill (INDIA) publishers, New Delhi, third edition 2014.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
4. Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopaedia of terms and Applications, Wiley, New York, 1995.
5. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.

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23CMT23	CONTRACT LAWS AND REGULATIONS	L	T	P	C
		3	0	0	3

Course Objectives:

- To study the various types of construction contract and their legal aspects and provisions..
- To learn concepts in Tenders.
- To learn concepts in Arbitration and legal requirements
- To study the concepts in labour regulations.

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 – Tamilnadu Transparency in Tenders Act.

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 – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Design the construction contracts.
CO2	Develop a skill for the tendering process
CO3	Explain the duties of the arbitrator.
CO4	Develop an idea on the various legal requirements to be met in relation to land and construction
CO5	Identify and apply the provisions provided in the labour welfare schemes.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2
CO2	3	2	3	3	3	3
CO3	3	1	3	3	2	2
CO4	3	1	3	3	3	2
CO5	3	1	3	3	3	2

Reference Books:

1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, 2000.
2. Jimmie Hinze, Construction Contracts, McGraw Hill, 3rd Edition, 2013.
3. Ali D. Haidar, Handbook of Contract Management in Construction, Springer Cham, 1st Edition, 2021
4. Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, 4th Edition 2015.
5. Dharmendra Rautray, Principles of Law of Arbitration in India, Wolters Kluwer, 2018.

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https://archive.nptel.ac.in/courses/105/103/105103093/

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23CML21	CONSTRUCTION MANAGEMENT STUDIO LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives:

- To train the students in utilizing the sophisticated spreadsheets programs,
- To train the students to handle estimation software.
- To train the students to handle the Project management software.

List of Experiments **60**

1. Scheduling of a small construction project using Primavera scheduling systems including reports and tracking.
2. Scheduling of a small construction project using tools like MS project scheduling systems including reports and tracking.
3. Simulation models for project risk analysis.
4. Virtual progress tracking of small construction project using Navisworks
5. Model a simple building project using Building Information Modelling (BIM)

Total Hours **60**

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Prepare the proposal for a construction project
CO2	Store and retrieve information about the equipments
CO3	Track the activities and schedule a construction project using PRIMAVERA
CO4	Track and schedule a construction project using MS Project
CO5	Develop a simulation model for analysing the project risk

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3
CO2	2	3	3	3	3	3
CO3	3	2	3	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

Reference Books:

1. SVHEC- Construction Management Studio Laboratory Manual.

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23CML22	STATISTICAL ANALYSIS FOR CONSTRUCTION ENGINEERS LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives:

- To provide hands on training in basic spread sheet software.
- To provide hands on training in advanced spread sheet software.
- To provide hands on training in data analytical tools

List of Experiments **60**

1. Descriptive Statistics: frequency distribution, Applications (Charts, Graphs etc.)
2. Use of statistical packages Correlation, ANOVA , Cross Tabulation, *t*- Test and Simple and Multiple Regression
3. Solving Linear Programming Problems, Transportation and Assignment Models
4. Solving Network Flow Models
5. Solving Decision making Problems in Project Management

Total Hours **60**

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Formulate descriptive statistics with charts and graphs using spreadsheet softwares and interpretation of results
CO2	Analyse construction management field data using Statistical tools.
CO3	Solve Linear Programming Problems, transportation and assignment problems by appropriate techniques and evaluate the behaviour under different range of parameters
CO4	Perform network analysis and decision making in project management
CO5	Solve Construction management problems using decision making tool.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3
CO2	3	2	3	3	2	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

Reference Books:

1. SVHEC- Statistical Analysis for Construction Engineers Laboratory Manual.

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23CML31 **PRACTICAL TRAINING (4 Weeks)**

L	T	P	C
0	0	0	1

COURSE OBJECTIVES:

To train the students in the ieldwork so as to have irsthand knowledge of practical problems related to Construction Management in carrying out engineering tasks

SYLLABUS

The students individually undertake training in reputed engineering companies doing construction during the summer vacation for a speci ied duration of four weeks. At the end of the training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:

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

CO1 : Describe the Construction Industry

CO2 : Realize the various functions of construction activities

CO3 : Develop skills in facing and solving the problems experiencing in the Construction Management ield

CO4 : Report Preparation

CO5 : Presentation of work carried out in Practical Training

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	2	2	3	2	2
CO2	2	2	2	3	2	2
CO3	3	2	2	3	2	2
CO4	3	3	3	3	3	3
CO5	2	3	3	3	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CML32 **PROJECT WORK I**

L	T	P	C
0	0	12	6

COURSE OBJECTIVES:

- To identify a speci ic problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To develop the methodology to solve the identi ied problem.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

SYLLABUS

The student individually works on a speci ic topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear de inition of the identi ied problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner

TOTAL:180 HOURS

COURSE OUTCOMES:

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

CO1 : Apply the knowledge gained from theoretical and practical courses in solving problems

CO2 : Summarize the importance of literature review.

CO3 : Identify the problem

CO4 : solve the identi ied problem based on the formulated methodology

CO5 : Interpret and present the indings of the work conducted.

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CML41	PROJECT WORK II	L	T	P	C
		0	0	12	6

COURSE OBJECTIVES:

- To solve the identi ied problem based on the formulated methodology.
- To develop skills to analyze the research problem.
- To develop skills to discuss the test results, and make conclusions.

SYLLABUS

The student should continue the phase I work on the selected topic as per the formulated methodology/ Undergo internship. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated based on the report and the viva-voce examination by a panel of examiners including one external examiner.

TOTAL:360 HOURS

COURSE OUTCOMES:

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

CO1 : Discover the potential research areas

CO2 : Apply the knowledge gained from theoretical and practical courses to be creative, well planned, organized and coordinated

CO3 : Identify the problem

CO4 : solve the identi ied problem based on the formulated methodology

CO5 : Interpret and present the indings of the work conducted.

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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		L	T	P	C
23CME11	**ADVANCED CONCRETE TECHNOLOGY**	3	0	0	3

Course Objectives:

- To study the properties of concrete making materials, tests, mix design, special concretes, and various methods for making concrete.

UNIT-I **CONCRETE MAKING MATERIALS** **9**

Aggregates classification IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates - Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements - Water - Chemical admixtures, Mineral admixture.

UNIT-II **MIX DESIGN** **9**

Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Mix design for special concretes- changes in Mix design for special materials.

UNIT-III **CONCRETING METHODS** **9**

Process of manufacturing of concrete, methods of transportation, placing and curing, cracking, plastic shrinkage, Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete

UNIT-IV **SPECIAL CONCRETES** **9**

Light weight concrete Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting Concrete, Geo Polymer Concrete, Waste material-based concrete – Ready mixed concrete.

UNIT-V **TESTS ON CONCRETE** **9**

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete. Non-destructive Testing Techniques - microstructure of concrete

Total Hours **45**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Develop knowledge on various materials needed for concrete manufacture
CO2	Apply the rules to do mix designs for concrete by various methods
CO3	Develop the methods of manufacturing of concrete
CO4	Explain about various special concrete
CO5	Explain various tests on fresh and hardened concrete

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	1
CO2	2	2	2	2	2	2
CO3	3	2	3	3	1	2
CO4	3	2	3	2	2	1
CO5	2	2	2	2	2	2

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1. Gupta.B.L., Amit Gupta, "Concrete Technology, Jain Book Agency, 2017.
2. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2019.
3. Gambhir.M.L., Concrete Technology, McGraw Hill Education, 2006.
4. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
5. Job Thomas., Concrete Technology, Cencage learning India Private Ltd, New Delhi, 2015.

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		L	T	P	C
23CME12	**HUMAN RESOURCES MANAGEMENT IN CONSTRUCTION**	3	0	0	3

Course Objectives:

- To understand the various aspects of manpower management and to help the student further develop their management, team building and leadership skills so as to increase their effectiveness in their job performance on international projects

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 organisation- Management process in organisations- Planning-Organising-Staffing- Directing- Controlling – Delegation of authority – responsibility – accountability – lines and staff organisation Workforce diversity- international dimensions of Organisation-Organisational structure- determinants of organisational 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 organisations - 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.

Total Hours **45**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Demonstrate practices and techniques for evaluating performance, structuring teams, coaching and mentoring people.
CO2	Explain the role of the leader and leadership principles and attitudes
CO3	Demonstrate an understanding of professional and ethical responsibilities; and
CO4	Demonstrate commitment to quality, timeliness, and continuous improvement.
CO5	Interpret their future managerial role, with emphasis on the management of the human resources and with a multi-cultural perspective

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	3	3	3	3
CO2	2	1	1	3	3	3
CO3	1	1	2	3	3	3
CO4	2	2	1	3	3	3
CO5	2	1	2	3	3	3

Reference Books:

1. Charles D Pringle, Justin GooderiLongenecter, Management, CE Merril Publishing Co. 2001.
2. Dwivedi R.S, Human Relations and Organisational Behaviour, Macmillian India Ltd.,2005.
3. Josy .J, Familaro, "Handbook of Human Resources Administration", McGraw-Hill Intemational Edition, 2007
4. D. Longford M.R. Hancock, R. Rellows& A. W. Gale, Human Recourse Management In Construction.– Longman Group Limited , fourth impression 2000.
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23CME13	CONSTRUCTION PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

- To study the various management techniques for successful completion of construction projects.

UNIT-I FUNDAMENTALS OF CONSTRUCTION PROJECT MANAGEMENT 9

Introduction of construction Project Management – Construction Scope – Construction Project Characteristics - Project development and Life Cycle – Construction Project Management Practice - Roles and Functions and Responsibility of Construction Managers and Major causes of Project failure.

UNIT-II PLANNING AND ORGANIZING CONSTRUCTION PROJECT 9

Construction Project organization – Planning Project work Scope and integration Processes - Defining Project Activities - Scheduling Project - CPM, PERT, Precedence Network Analysis – Planning and organizing project resources such as manpower, material, equipment, Time and cost for construction site.

UNIT-III DESIGN AND CONSTRUCTION PROCESS 9

Design and Construction as an Integrated System – Innovation, Economic and Technological Feasibility - Design Methodology - Functional Design - Construction Site Environment - Case Studies - Project Clearance requirement, Procedure and Necessary Documentation for Major Works Like Dams, Multistoried Structures, Ports, Tunnels

UNIT-IV PROJECT RESOURCES UTILIZATION 9

Labor productivity variations, productivity improvement - work study - Materials purchase & inventory control - Construction Equipment - Choice of Equipment and Standard Production Rates – Time management and Cost management - Measuring project progress & performance – Tools and Techniques.

UNIT-V RISK MANAGEMENT AND PROJECT CONTROLLING 9

Risks management at construction site - Controlling resource productivity – Schedule and Cost Controlling system – Earned value management system – Project Management Information systems.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Explain the stages involved in a project and analyze the obligatory services to be taken up while performing a construction activity.
CO2	Apply the scheduling techniques for planning construction project
CO3	Develop the ability to integrate design and construction Process
CO4	Analyzing Resources utilization and resource productivity.
CO5	Assess the risk and controlling systems using project management Information system.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2
CO2	3	1	2	3	2	2
CO3	3	3	2	3	3	2
CO4	2	1	2	2	2	2
CO5	3	1	2	2	1	2

Reference Books:

1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 3rd Edition, 2014.
2. Choudhury S, Project Management, McGraw-Hill Publishing Company, New Delhi, 2017.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2nd edition, 2000.
4. Frederick E. Gould, Construction Project Management, Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology,4th Edition, 2013.
5. Kumar Neeraj Jha, Construction Project Management Theory and Practices, Pearson, 2012.

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23CME14	SUSTAINABLE CONSTRUCTION	L	T	P	C
		3	0	0	3

Course Objectives:

- To impart knowledge about sustainable construction and to understand the concepts of sustainable materials, energy calculations, green buildings and environmental effects.

UNIT-I INTRODUCTION 9

Introduction and definition of Sustainability - Carbon cycle - role of construction material: concrete and steel, etc. - CO2 contribution from cement and other construction materials.

UNIT-II MATERIALS USED IN SUSTAINABLE CONSTRUCTION 9

Construction materials and indoor air quality - No/Low cement concrete - Recycled and manufactured aggregate - Role of QC and durability - Life cycle and sustainability.

UNIT-III ENERGY CALCULATIONS 9

Components of embodied energy - calculation of embodied energy for construction materials - Energy concept and primary energy - Embodied energy via-a-vis operational energy in conditioned building - Life Cycle energy use

UNIT-IV GREEN BUILDINGS 9

Control of energy use in building - ECBC code, codes in neighboring tropical countries - OTTV concepts and calculations – Features of LEED and TERI – Griha ratings - Role of insulation and thermal properties of construction materials - influence of moisture content and modeling - Performance ratings of green buildings - Zero energy building

UNIT-V ENVIRONMENTAL EFFECTS 9

Non-renewable sources of energy and Environmental aspects – energy norm, coal, oil, natural gas - Nuclear energy - Global temperature, Green house effects, global warming - Acid rain: Causes, effects and control methods - Regional impacts of temperature change.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Summarize the various sustainable materials used in construction.
CO2	Explain the method of estimating the amount of energy required for building.
CO3	Interpret the features of LEED, TERI and GRIHA ratings of buildings.
CO4	Relate the concept and performance of zero energy buildings
CO5	Select less carbon emission materials for construction

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	3	1	2	1
CO2	3	2	3	2	2	2
CO3	3	3	2	1	3	1
CO4	3	3	3	2	3	2
CO5	3	1	2	2	3	2

Reference Books:

1. Charles J Kibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition, Wiley Publishers 2016.
2. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell, UK, 2016.
3. Craig A. Langston & Grace K.C. Ding, Sustainable Practices in the Built Environment, Butterworth Heinemann Publishers, 2011.
4. William P Spence, Construction Materials, Methods & Techniques (3e), Yesdee Publication Pvt. Ltd, 2012.
5. New Building Materials and Construction World magazine

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23CME21	ECONOMICS AND FINANCE MANAGEMENT IN CONSTRUCTION	L	T	P	C
		3	0	0	3

Course Objectives:

- To introduce the various aspects of Construction economics and finance with the systematic evaluation of cost and benefit associated with different projects

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 – GST– Input Tax Credit (ITC) – Assessment and Administration of GST – 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.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Summarize the basic principles of Economic in construction
CO2	Evaluate alternate proposals
CO3	Evaluate alternative investments
CO4	Select best source of finance for a project
CO5	Elaborate the finance and accounting

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	1	1	1	3	3	1
CO2	2	2	1	2	2	1
CO3	1	2	2	3	3	2
CO4	2	2	1	2	2	1
CO5	1	1	2	1	1	3

Reference Books:

1. Patel, B M Project management- strategic Financial Planning, Evaluation and Control, Vikas Publishing House Pvt. Ltd. New Delhi, 2000
2. Shrivastava,U.K., Construction Planning and Management,2nd Edn. Galgotia Publications Pvt. Ltd. New Delhi., 2001.
3. Blank, L.T., and Tarquin,a.J Engineering Economy,4th Edn. Mc-Graw Hill Book Co., 1988
4. Collier C and GlaGola C Engineering Economics & Cost Analysis, 3nd Edn. Addison Wesley Education Publishers.,1998.
5. Steiner, H.M. Engineering Economic principles, 2nd Edn. McGraw Hill Book, 1996

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23CME22	DESIGN OF ENERGY EFFICIENT BUILDINGS	L	T	P	C
		3	0	0	3

Course Objectives:

- To understanding the concept of energy consumption in buildings and design a energy efficient building

UNIT-I INTRODUCTION 9

Climate adapted and climate rejecting buildings – Heat Transfer – Measuring Conduction – Thermal Storage – Measurement of Radiation – The Greenhouse Effect – Convection – Measuring latent and sensible heat – Psychrometry Chart – Thermal Comfort – Microclimate, Site Planning and Development – Temperature – Humidity – Wind – Optimum Site Locations – Sun Path Diagrams – Sun Protection – Types of Shading Devices – Design responses to energy conservation strategies.

UNIT-II PASSIVE SOLAR HEATING AND COOLING 9

General Principles of passive Solar Heating – Key Design Elements – Sunspace – Direct gain – Trombe Walls, Water Walls – Convective Air loops – Concepts – Case Studies – General Principles of Passive Cooling – Ventilation – Principles – Case studies – Courtyards – Roof Ponds – Cool Pools – Predicting ventilation in buildings – Window Ventilation Calculations – Room Organization Strategies for Cross and Stack Ventilation – Radiation – Evaporation and dehumidification – Wind Catchers – Mass Effect – Zoning – Load Control – Air Filtration and odor removal.

UNIT-III DAYLIGHTING AND ELECTRICAL LIGHTING 9

Materials, components and details – Insulation – Optical materials – Radiant Barriers – Glazing materials – Glazing Spectral Response – Day lighting – Sources and concepts –Building Design Strategies – Case Studies – Daylight apertures – Light Shelves – Codal requirements – Day lighting design – Electric Lighting – Light Distribution – Electric Lighting control for day lighted buildings – Switching controls – Coefficient of utilization – Electric Task Lighting – Electric Light Zones – Power Adjustment Factors.

UNIT-IV HEAT CONTROL AND VENTILATION 9

Hourly Solar radiation – Heat insulation – Terminology – 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 – Calculation of probable indoor wind speed.

UNIT-V DESIGN FOR CLIMATIC ZONES 9

Energy efficiency – An Overview of Design Concepts and Architectural Interventions – Embodied Energy – Low Embodied Energy Materials – Passive Downdraft Evaporative Cooling – Design of 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 – Commonly used software packages in energy efficient building analysis and design - Energy Audit – Certification.

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Explain environmental energy supplies on buildings
CO2	Explain the passive solar heating, cooling system
CO3	Discuss the various aspects of day-lighting and electrical lighting in a building
CO4	Predict and design building ventilation and heat control for indoor comfort
CO5	Design a building for climatic zone and apply simulation programs of buildings to perform energy calculations

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1
CO2	2	3	2	3	2	1
CO3	3	2	2	3	2	2
CO4	2	2	3	3	3	3
CO5	3	2	2	2	3	3

Reference Books:

1. Energy Conservation Building Code, Bureau of Energy Efficiency, New Delhi, 2018.
2. Brown, G.Z. and DeKay, M., Sun, Wind and Light - Architectural Design Strategies, John Wiley and Sons Inc,3rd Edition, 2014.
3. Handbook on Functional Requirements of Buildings Part 1 to 4 SP : 41 (S and T) 1995
4. Residential Energy: Cost Savings and Comfort for Existing Buildings by John Krigger and Chris Dorsi, Published by Saturn Resource Management, 2013.
5. Majumdar, M (Ed), Energy - Efficient Buildings in India, Tata Energy Research Institute, Ministry of Non-Conventional Energy Sources, 2009.

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23CME23	PROJECT SAFETY MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

- To study and understand the various safety concepts and requirements applied to construction projects.

UNIT-I CONSTRUCTION ACCIDENTS 9

Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications.

UNIT-II SAFETY PROGRAMMES 9

Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives.

UNIT-III CONTRACTUAL OBLIGATIONS 9

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping - Occupational Safety and Health Administration Manuals, Laws and Act - Indian and International Practices.

UNIT-IV DESIGNING FOR SAFETY 9

Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety Personnel – Sub contractual Obligation – Project Coordination and Safety Procedures – Workers Compensation.

UNIT-V OWNERS' AND DESIGNERS' OUTLOOK 9

Owners and Designers – Roles and responsibility in ensuring safety – Preparedness – Role of the designer in ensuring safety – Safety clause in the design document

Total Hours 45

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Develop knowledge on accidents and their causes.
CO2	Develop knowledge about safety programs and job-site safety assessments.
CO3	Apply the knowledge of contractual obligations.
CO4	Explain about designing for safety and safety procedures.
CO5	Develop the knowledge of owners' and designers' responsibilities.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	1	1	1	2	2	2
CO2	2	1	2	2	2	2
CO3	1	1	1	2	1	2
CO4	1	1	2	2	2	2
CO5	1	1	2	2	2	2

Reference Books:

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997.
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.
3. Sathyanarayanan Rajendran and Mandi Kime, Construction Project Safety-Management Best-Practices Handbook, 2013.
4. Safety, Health and Environmental Handbook, CPWD, 2019.
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23CME24	COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND PLANNING	L	T	P	C
		3	0	0	3

Course Objectives:

- To study and understand the optimization techniques, inventory models and scheduling techniques applied to construction engineering.

UNIT-I **INTRODUCTION** **9**

Overview of IT Applications in Construction – Construction process – Computerization in Construction – Computer-aided Cost Estimation – Developing applications with database software.

UNIT-II **OPTIMIZATION TECHNIQUES** **9**

Linear, Dynamic, and Integer Programming - Branch and Bound Techniques – Application to Production Scheduling, Equipment Replacement, 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.

Total Hours **45**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Use of software's in construction Industry.
CO2	Apply various optimization techniques.
CO3	Apply Deterministic and Probabilistic Inventory Models.
CO4	Analyze the scheduling concepts.
CO5	Solve problems using simulation and ERP systems.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	1
CO2	1	1	2	3	2	2
CO3	3	2	2	3	2	2
CO4	2	1	1	3	2	2
CO5	1	1	2	2	1	2

Reference Books:

1. Billy E. Gillet., Introduction to Operations Research – A Computer Oriented Algorithmic Approach, McGraw Hill, 2008.
2. Feigenbaum, L., Construction Scheduling with Primavera Project Planner Prentice Hall Inc., 2002.
3. Ming Sun and Rob Howard, "Understanding I.T. in Construction, Spon Press, Taylor and Francis Group, 2004.
4. Paulson, B.R., Computer Applications in Construction, McGraw Hill, 1995.
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23CME25	QUANTITATIVE TECHNIQUES IN MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

- To study the various quantitative methods applied to the elements of management, the effect of production management, finance management, decision theory, and managerial economics.

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 - EOQ Model - Quantity Discounts - Safety Stock – Replacement Theory – PERT and 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.

Total Hours **45**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Apply the knowledge of science and engineering fundamentals in learning the concept of operations research and its practical applicability for solving challenges in construction.
CO2	Identify, formulate, plan and schedule construction engineering projects.
CO3	Apply the knowledge of financial management and cost concepts
CO4	Design the required man, material, equipment, cost and time as per needs by proper decision rules.
CO5	Analyze the cost by break-even analysis and modern construction management software.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1
CO2	2	2	2	3	3	3
CO3	2	1	1	3	3	2
CO4	2	1	2	3	3	3
CO5	1	1	2	3	3	3

Reference Books:

1. Frank Harrison, E., The Managerial Decision-Making Process, Houghton Mifflin Co., Boston, 1999.
2. Hamdy. A.Taha, Operations Research: An Introduction, Prentice Hall, 2010.
3. Levin, R.I, Rubin,D.S., and Stinson J., Quantitative Approaches to Management, McGraw Hill College, 1993.
4. Tang S.L., Irtishad U.Ahmad, Syed M.Ahmed, Ming Lu, Quantitative Technique for Decision making in Construction, Hongkong University Press, HKU, 2004.
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23CME26	RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION	L	T	P	C
		3	0	0	3

Course Objectives:

- To impart the concepts of resource planning
- To impart the concepts of labor management.
- To impart the concepts of material and equipment.
- To impart the concepts of time management.
- To impart the concepts of resource allocation and resource leveling in construction

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, optimum use Labour.

UNIT-III **MATERIALS AND EQUIPMENT** **9**

Material: Time of purchase, the quantity of material, sources, Transportation, Delivery, and Distribution Equipment: Planning and selecting 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 levelling, resource list, resource allocation, Resource loading, Cumulative cost – Value Management.

Total Hours **45**

Chairman
BoS / Civil

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Identify the different types of resources in a construction industry
CO2	Evaluate the labour productivity and the influencing factors
CO3	Calculate the equipment output and the operation condition of construction equipment
CO4	Describe the terms of cash inflow, cash outflow, and balance sheet
CO5	Categorize the time and cost-related information in a construction sector.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	2	1	3	2	2
CO2	3	2	2	3	2	2
CO3	2	2	2	3	2	2
CO4	3	2	3	3	2	2
CO5	2	2	2	3	2	2

Reference Books:

1. Sharma, S C., Construction equipment management, Khanna publishers, Delhi, 2016.
2. Kumar Neeraj Jha Construction project management, Pearson publishers, 2015.
3. Andrew, D., Szilagg, Hand Book of Engineering Management, 1982.
4. Oxley Rand Poslcit, Management Techniques applied to the Construction Industry, Granda Publishing Ltd., 1996.
5. Paul Netscher, Construction Project Management: Tips and Insights, Panet Publications, 2017.

Online sources:

https://nptel.ac.in/courses/105104161
http://www.digimat.in/nptel/courses/video/105104161/L01.html
https://elearn.nptel.ac.in/shop/iit-workshops/ongoing/construction-technology-and-management/

Chairman
BoS / Civil

23CME27 SHORING, SCAFFOLDING AND FORMWORK

L	T	P	C
3	0	0	3

Course Objectives:

- To disseminate knowledge about detailed planning.
- To impart knowledge about materials used in formwork.
- To learn design of formwork and shores.
- To disseminate knowledge about erection of form work.
- To impart knowledge about design of formwork for domes, shells, and tunnels.

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 - Aluminum - 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.

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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.

Total Hours 45

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Explain detailed planning of formwork, plant, and site equipment.
CO2	Select material accessories for formwork connection and analyze pressures on formworks
CO3	Design the forms and shores.
CO4	Apply the knowledge of erecting forms for beams, slabs, columns, walls, and causes of failures.
CO5	Apply the knowledge of forms and their erection for domes and tunnels, types of slip forms, and scaffolds.

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	1	2	3	2
CO2	2	2	2	3	2	3
CO3	1	1	1	3	3	3
CO4	3	1	3	3	2	3
CO5	1	1	1	3	2	3

Reference Books:

1. Austin, C.K., Formwork for Concrete, Cleaver -Hume Press Ltd., London, 1996.
2. Hurd, M.K., Formwork for Concrete, Seventh Edition, American Concrete Institute, Detroit, 2016
3. Michael P. Hurst, Construction Press, London and New York, 2003.
4. Robert L. Peurifoy and Garold D. Oberlender, Formwork for Concrete Structures, McGraw - Hill, 2010.
5. Kumar Neeraj Jha, Formwork for Concrete Structures, 2017

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Online sources:

http://www.cv.titech.ac.jp/~courses/atce2/Lesson3.pdf
https://civil4m.com/threads/presentation-on-formwork-scaffolding-and shoring.8616/
https://archive.nptel.ac.in/courses/112/107/112107217/
https://archive.nptel.ac.in/courses/105/106/105106113/

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BoS / Civil

23CME28	SYSTEM INTEGRATION IN CONSTRUCTION	L	T	P	C
		3	0	0	3

Course Objectives:

- To understand how the various systems that constitute a building design which are interwoven and integrated with a view to achieving a high-performance building;
- To understand about the various environmental factors.
- To understand about the various services.
- To understand about the various maintenance.
- To understand various concepts in safety planning.

UNIT-I STRUCTURAL INTEGRATION **9**

Structural System, Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and Specification

UNIT-II ENVIRONMENTAL FACTORS **9**

Qualities of enclosure necessary to maintain a specified level of interior environmental quality – weather resistance – Thermal infiltration – Acoustic Control – Transmission reduction – Air quality – illumination – Relevant systems integration with structural systems

UNIT-III SERVICES **9**

Plumbing – Electricity – Vertical circulation and their interaction – Heating Ventilation and Air-conditioning Systems in Buildings and implementation techniques in High Rise Buildings.

UNIT-IV MAINTENANCE **9**

Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction – access for maintenance – Feasibility for replacement of damaged components – equal life elemental design – maintenance free exposed and finished surfaces.

UNIT-V SAFETY PLANNING **9**

Ability of systems to protect fire – Preventive systems – fire escape system design – Planning for pollution free construction environmental – Hazard free Construction execution for High Rise Buildings.

Total Hours **45**

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COURSE OUTCOMES

CO's	OUTCOMES
CO1	Integrate the various construction techniques and incorporate into the building process
CO2	Appreciate the requirements and elements of HVAC, mechanical, electrical, hydraulic and transportation services in buildings
CO3	Design and integrate services into high-rise buildings
CO4	Interpret the intricacies of physical installation of services and their critical sequence in the construction process.
CO5	Adopt an approach relating systems to aim for a high performance building in various categories of major use

CO, PO & PSO MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2
CO2	2	2	3	2	3	2
CO3	2	3	1	2	3	2
CO4	3	1	1	2	3	2
CO5	3	2	3	2	3	2

Reference Books:

1. A.J. Elder and Martiz Vinden Barg, Handbook of Building Enclosure, McGraw-Hill Book Company, 1983.
2. David V. Chadderton, Building Services Engineering, Taylor and Francis, 2013.
3. Jane Taylor and Gordon Cooke, The Fire Precautions Act in Practices, 1987.
4. Peter R. Smith and Warren G. Julian, Building Services, Applied Science Publishers Ltd., London, 1993.
5. William T. Mayer, Energy Economics and Building Design, McGraw-Hill Book Company, 1983.

Online sources

https://nptel.ac.in/courses/103107093
https://nptel.ac.in/courses/103107094
https://archive.nptel.ac.in/courses/108/108/108108157/

Chairman
BoS / Civil

23CME31	ADVANCED DATA ANALYSIS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn concepts of data for construction management.
- To learn concepts of various data analysis.
- To learn concepts of regression and factor analysis.
- To learn concepts of discriminant and cluster analysis.
- To learn concepts of advanced multivariate data analysis techniques

UNIT-I STATISTICAL DATA ANALYSIS 9

Data and Statistics- Review of Basic Statistical Measures-Probability Distributions-Testing of Hypotheses-Non-Parametric Tests.

UNIT-II BASIC CONCEPTS 9

Introduction – Basic concepts – Uni-variate, Bi-variate and Multi-variate techniques – Types of multivariate techniques – Classification of multivariate techniques – Guidelines for multivariate analysis and interpretation – Approaches to multivariate model building.

UNIT-III REGRESSION AND FACTOR ANALYSIS 9

Simple and Multiple Linear Regression Analysis – Introduction – Basic concepts – Multiple linear regression model – Least square estimation – Inferences from the estimated regression function – Validation of the model. Factor Analysis: Definition – Objectives – Approaches to factor analysis – methods of estimation – Factor rotation – Factor scores - Sum of variance explained – interpretation of results. Canonical Correlation Analysis - Objectives – Canonical variates and canonical correlation – Interpretation of variates and correlations.

UNIT-IV DISCRIMINANT AND CLUSTER ANALYSIS 9

Discriminant Analysis - Basic concepts – Separation and classification of two populations - Evaluating classification functions – Validation of the model. Cluster Analysis – Definitions – Objectives – Similarity of measures – Hierarchical and Non – Hierarchical clustering methods – Interpretation and validation of the model.

UNIT-V ADVANCED TECHNIQUES 9

Conjoint Analysis – Definitions – Basic concepts – Attributes – Preferences – Ranking of Preferences – Output of Conjoint measurements – Utility - Interpretation. Multi-Dimensional

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BoS / Civil

Scaling – Definitions – Objectives – Basic concepts – Scaling techniques – Attribute and Non-Attributes based MDS Techniques – Interpretation and Validation of models. Advanced Techniques – Structural Equation modeling

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 : Describe the different statistical analysis techniques.

CO2 : Students will be able to formulate hypothesis

CO3 : Explore the basic concepts of statistical analysis

CO4 : Develop regression and factor analysis model and its interpretation

CO5 : Create discriminant and cluster analysis model and its interpretation

REFERENCE BOOKS:

1. Joseph F Hair, Rolph E Anderson, Ronald L. Tatham& William C. Black, Multivariate Data Analysis, Pearson Education, New Delhi, 2015.
2. Barbara G. Tabachnick, Linda S. Fidell, Using Multivariate Statistics, 6th Edition, Pearson, 2012.
3. Richard A Johnson and Dean W. Wichern, Applied Multivariate Statistical Analysis, Prentice Hall, New Delhi, 2012.
4. David R Anderson, Dennis J Sweeney and Thomas A Williams, Statistics for Business and Economics, Thompson, Singapore, 2002.
5. Howard E.A. Tinsley & Steven D. Brown, Handbook of Applied Multivariate Statistics & Mathematical modeling, Academic Press, 2000.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/111/104/111104024/
2. https://archive.nptel.ac.in/courses/111/105/111105091/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	1	2	2	3	1
CO2	2	3	2	2	3	3
CO3	2	1	2	2	2	2
CO4	3	2	2	2	2	3
CO5	1	2	3	2	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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BoS / Civil

23CME32	ENVIRONMENTAL IMPACT ASSESSMENT FOR CONSTRUCTION ENGINEERS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart the knowledge and skills required for understanding the various impacts of infrastructure projects on the environment.
- To impart knowledge about prediction and assessment of EIA.
- To impart the knowledge of health and socio-economic impact assessment.
- To impart the knowledge and expose the students to the various methodologies available to assess.
- To impart the knowledge to develop the skill to prepare Environmental Impact Assessment report

UNIT-I INTRODUCTION 9

Sustainable Development challenges and needs - Key approaches for Impact Assessment – EIA approach: historical development - Legal and Regulatory aspects in India - Types and Objectives, Components, Process of EIA.

UNIT-II PREDICTION AND ASSESSMENT 9

Prediction and Assessment: tools - impact on air, water, soil & Noise - Role of Biodiversity impact Assessment - Identification, Prediction and Evaluation of Impacts on Biodiversity - Techniques of Biodiversity impact assessment - EIA Report Preparation - Environmental Management Plan: Preparation and implementation - Mitigation and Rehabilitation plans - Post Project Audit.

UNIT-III HEALTH AND SOCIO-ECONOMIC IMPACT ASSESSMENT 9

Health Assessment: Impact of Environment on Health - Developing framework for Health impact analysis, tools, and techniques - Socio-Economic Impact Assessment: Overview and Scope of Social Impact Assessment - SIA model and the planning process - Land acquisition: Legal aspects, Resettlement & Rehabilitation, and Development.

UNIT-IV INTEGRATED ANALYSIS 9

Integrated Analysis of Environmental, Social, and Health Impacts - Challenges for Integrated Approach - Scope for Integrated approach in economic analysis - CBA, Social CBA, and Cost-effectiveness Analysis - Analytic Hierarchy process-based Approach - Emerging Dimensions and Future Directions.

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UNIT-V IMPACT OF INFRASTRUCTURE AND ENVIRONMENTAL SERVICES 9

Case Studies: EIA for Mining, extraction of natural resources and power generation - Primary Processing and Material Production - Material Processing, Manufacturing/Fabrication - Service Sectors - Physical Infrastructure including Environmental Services - Building and Construction Projects - Area Development Projects and Townships - Strategic Environmental Assessment, Technological Assessment, and Risk Assessment.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

CO1 : Apply the knowledge of science and engineering fundamentals to sustainable development challenges.

CO2 : Explain the identification, prediction, and evaluation of impacts that will be caused by projects or industries on biodiversity.

CO3 : Identify the legal requirements of environmental impact assessment for projects.

CO4 : Develop the ability to perform integrated analysis by considering environmental, social, and health impacts.

CO5 : Select appropriate methods for environmental impact assessment for Infrastructure and environmental service.

REFERENCE BOOKS:

1. Anjaneyulu, Yerramilli, and Valli Manickam, "Environmental impact assessment methodologies", Hyderabad: BS Publications, Third Edition 2022.
2. Lawrence, D.P., "Environmental Impact Assessment – Practical Solutions to recurrent problems", Wiley-Interscience, New Jersey, 2003.
3. Petts, J., "Handbook of Environmental Impact Assessment', Vol., I and II, Blackwell Science, London, 1999.
4. Canter, L.W., "Environmental Impact Assessment", McGraw Hill, New York, 1996.
5. World Bank – Source Book on Environmental Impact Assessment, 2010

E-RESOURCES:

1. **https://archive.nptel.ac.in/courses/124/107/124107160/**
2. **https://www.youtube.com/watch?v= iLdyhgFv1U**

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3
CO2	2	2	3	3	3	2
CO3	2	1	1	3	2	3
CO4	1	1	3	3	2	2
CO5	3	2	2	3	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23CME33 LEAN CONSTRUCTION CONCEPTS, TOOLS, AND PRACTICES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge about the basics of lean construction.
- To impart knowledge about the lean principles.
- To impart knowledge about the core concepts of lean construction.
- To impart knowledge about the lean tools and techniques.
- To impart knowledge about the basics of lean implementation in the construction industry.

UNIT-I INTRODUCTION 9

Introduction and overview of the construction project management -Review of Project Management& Productivity Measurement Systems – Productivity in Construction– Daily Progress Report-The state of the industry for its management practices –construction project phases - Essential features of contemporary construction management techniques - The problems with current construction management techniques– Current production planning.

UNIT-II LEAN MANAGEMENT 9

Introduction to lean management – Toyota's management principle-Evolution of lean in the construction industry - Production theories in construction –Lean construction value - Value in construction - Target value design – Lean project delivery system- Forms of waste in the construction industry – Waste Elimination.

UNIT-III CORE CONCEPTS IN LEAN 9

Concepts in lean thinking – Principles of lean construction – Variability and its impact – Traditional construction and lean construction – Traditional project delivery - Lean construction and workflow reliability – Work structuring – Production control.

UNIT-IV LEAN CONSTRUCTION TOOLS AND TECHNIQUES 9

Value Stream Mapping – Work sampling – Last planner system – Flow and pull-based production – Last Planner System – Look ahead schedule – constraint analysis – weekly planning meeting- Daily Huddles – Root cause analysis – Continuous improvement – Just in time.

UNIT-V LEAN CONSTRUCTION IMPLEMENTATION 9

Lean construction implementation- Enabling lean through information technology – Lean in design - Design Structure Matrix Location Based Management System-BIM (Building Information Modelling) - IPD (Integrated Project Delivery) – Sustainability through lean construction approach

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

CO1 : Explains the contemporary management techniques and the issues in the present scenario.

CO2 : Apply the basics of lean management principles and their evolution from the manufacturing industry to the construction industry.

CO3 : Develops a better understanding of core concepts of lean construction tools and techniques and their importance in achieving better productivity.

CO4 : Apply lean techniques to achieve sustainability in construction projects.

CO5 : Apply lean construction techniques in design and modeling

REFERENCE BOOKS:

1. Corfe, C. and Clip, B., Implementing lean in construction: Lean and the sustainability agenda, CIRIA, 2013.
2. Shang Gao and Sui Pheng Low, Lean Construction Management: The Toyota Way, Springer, 2014.
3. Dave, B., Koskela, L., Kiviniemi, A., Owen, R., andTzortzopoulos, P., Implementing lean in construction: Lean construction and BIM, CIRIA, 2013.
4. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., Lean construction tools and techniques, 2002.
5. Salem, O., Solomon, J., Genaidy, A. and Luegring, M., Site Implementation and Assessment of Lean Construction Techniques, Lean Construction Journal, 2005.
6. Lincoln H. Forbes , Syed M. Ahmed, Lean Project Delivery and Integrated Practices in Modern Construction, Routledge Publishers, 2nd Edition, 2020.

E-RESOURCES:

1. **https://archive.nptel.ac.in/courses/105/106/105106213/**
2. **https://leanconstruction.org.uk/wp-content/uploads/2018/09/Ballard-et-al.-Lean-Construction-tools-and-techniques.pdf**

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	1	2	3	2	2
CO2	2	1	1	3	3	2
CO3	2	1	1	3	1	2
CO4	3	1	1	3	2	1
CO5	2	1	1	3	2	1

1 - low, 2 - medium, 3 - high, '-' - no correlation

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SVHEC-R2023

23CME34	MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the damages, repair and rehabilitation of structures

UNIT-I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, Repair and Rehabilitation, retrofit and strengthening, need for rehabilitation of structures- Service life behaviour - importance of Maintenance, causes and effects of deterioration. Non-destructive Testing Techniques.

UNIT-II STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete based on Strength , Durability and Microstructure of concrete - NDT techniques- Cracks- different types, causes – Effects due to Environment, Fire , Earthquake, Corrosion of steel in concrete, Mechanism, quantification of corrosion damage.

UNIT-III REPAIR MATERIALS AND SPECIAL CONCRETES 9

Special mortars and concretes- Polymer Concrete and Grouting materials- Bonding agents-Latex emulsions, Epoxy bonding agents, Protective coatings-Protective coatings for Concrete and Steel, FRP sheets.

UNIT-IV PROTECTION METHODS AND STRUCTURAL HEALTH MONITORING 9

Concrete protection methods – reinforcement protection methods- cathodic protection - Sacrificial anode - Corrosion protection techniques – Corrosion inhibitors, concrete coatings-Corrosion resistant steels, Coatings to reinforcement, Structural health monitoring.

UNIT-V REPAIR, RETROFITTING AND DEMOLITION OF STRUCTURES 9

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Repair to active cracks, Repair to dormant cracks. Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Techniques, Strengthening Methods for Structural Elements. Engineered Demolition -Case studies.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1 : Explain the importance of maintenance assessment and repair strategies

CO2 : Acquire knowledge of strength and durability properties and their effects due to climate and temperature.

CO3 : Gain knowledge of recent developments in repair

CO4 : Explain the techniques for repair and protection methods

CO5 : Explain the repair, rehabilitation and retrofitting of structures and demolition methods.

REFERENCE BOOKS:

1. Dodge Woodson, Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann, Elsevier,New Delhi 2012
2. DovKominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt.Ltd., 2001
3. Ravishankar.K.,Krishnamoorthy.T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.
4. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
5. Hand Book on "Repair and Rehabilitation of RCC Buildings" – Director General works CPWD ,Govt of India , New Delhi – 2002
6. BS EN 1504 - Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity

E-RESOURCES:

1. **https://archive.nptel.ac.in/courses/105/106/105106202/**
2. **https://archive.nptel.ac.in/courses/105/105/105105213/**

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
1	3	-	2	3	2	2
2	3	1	-	2	2	1
3	3	-	2	2	3	1
4	3	1	-	3	2	2
5	3	2	1	2	2	1
Avg	3	1.33	1.67	2.40	2.20	1.40

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CME35	QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the concepts of quality management in construction.
- To study the concepts of quality systems.
- To study the concepts of quality planning.
- To study the concepts of quality assurance and control techniques in construction.
- To study the concepts of quality improvement techniques.

UNIT-I QUALITY MANAGEMENT 9

Introduction – Definitions and objectives – Dimensions of quality - Factors influencing construction quality – Responsibilities and authority – Methods to improve quality – Quality Process - Quality plan – Quality Management Guidelines – Quality circles.

UNIT-II QUALITY SYSTEMS 9

Introduction – History of standards - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third-party Certification – Emission Norms – BS Norms.

UNIT-III QUALITY PLANNING 9

Quality Policy, Objectives and methods in the Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – TQM – Traditional approach vs. Modern approach – Principles of TQM - Taguchi's concept of quality – Quality function deployment - 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 – Sampling techniques – Sampling plan – Sampling Terms – AQL, LTPD, AOL - 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 – Failure rate – Mean time to failure – Mean time to repair – Mean time between failures.

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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

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 : Achieve the knowledge of quality management guidelines, and quality circles.

CO2 : Apply the quality standards for preparing Quality system documents.

CO3 : Explain the skill of preparing inspection procedures for quality planning.

CO4 : Select the techniques and tools for Quality Assurance and Control in Construction Industry.

CO5 : Achieve the knowledge of quality improvement techniques.

REFERENCE BOOKS:

1. Hutchins. G, ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and Successful Certification, Viva Books Pvt. Ltd., 1994.
2. James, J.O' Brian, Construction Inspection Handbook – Total Quality Management, Van Nostrand, 1997
3. KB Rajoria, Deepak Naryan, Deepak Gupta, ISO 9000 Practices in construction, CBS Publishers & Distributors Pvt. Ltd.,ISBN:978-93-90709-33-5, 2021.
4. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, McGraw Hill, 2001
5. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longman Ltd, 1998

E-RESOURCES:

1. **https://onlinecourses.nptel.ac.in/noc20_mg18/preview**
2. **https://archive.nptel.ac.in/courses/110/104/110104080/**

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	2	1	1	3	2	2
CO2	2	2	1	2	1	1
CO3	1	2	1	1	3	2
CO4	2	2	3	3	2	2
CO5	1	2	1	1	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23CME36	DIGITAL DESIGN AND CONSTRUCTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn basic concepts of BIM for construction.
- To learn and acquire knowledge in the BIM-based construction design process.
- To understand the challenges in BIM implementation
- To learn and acquire knowledge in BIM-based construction automation technologies.
- To learn and acquire knowledge in Modern Digital Technologies in Construction

UNIT-I INTRODUCTION TO BIM FOR CONSTRUCTION 9

Fundamentals of BIM – terminology, CAD & BIM. IFCs, schemas, interoperability, parametric modeling.

UNIT-II DEVELOPMENT OF DESIGN PROCESS 9

BIM-based design process and analysis - design coordination. BIM-based construction process – 4D, 5D, nD BIM.

UNIT-III CHALLENGES IN BIM IMPLEMENTATION 9

BIM-based operation issues – facility management. Drivers and barriers in BIM adoption, BIM global practices.

UNIT-IV CONSTRUCTION AUTOMATION 9

Automation in design and construction, virtual experiments – augmented reality, virtual reality, use of sensors in construction

UNIT-V MODERN DIGITAL TECHNOLOGIES IN CONSTRUCTION 9

Robots in construction, autonomous robots, and 3D printing technology in construction. Drones for Construction monitoring, Internet of Things, Smart Manufacturing, etc.

TOTAL : 45 PERIODS

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BoS / Civil

COURSE OUTCOMES:

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

CO1 : To create a BIM model

CO2 : To develop the construction design process using BIM

CO3 : To identify the challenges in BIM implementation

CO4 : To use automation techniques in construction

CO5 : To implement modern digital technologies in construction

REFERENCE BOOKS:

1. Daniotti, Bruno, Gianinetto, Marco, Della Torre, Stefano (Eds.), Digital Transformation of the Design, Construction and Management Processes of the Built Environment, Research for Development, Springer Open,2020.
2. Dominik Holzer, The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction, Wiley, 2016.
3. Erica Epstein, Implementing Successful Building Information Modeling, Artech House, 2012.
4. Javad Majrouhi Sardroud, Automation in Construction Management, Scholars' Press, 2014.
5. Thomas R. Kurfess, Robotics and Automation Handbook, CRC Press, 2018.

E-RESOURCES:

1. **https://www.youtube.com/watch?v=raZ5ljfSRbg**
2. **https://elearn.nptel.ac.in/shop/iit-workshops/completed/construction-technology-and-management/**

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3
CO2	3	3	2	3	3	2
CO3	1	1	1	3	2	3
CO4	3	3	3	3	2	2
CO5	1	1	1	3	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23CME37	ORGANIZATIONAL BEHAVIOUR	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn basic concepts of organizational behavior.
- To gain a solid understanding of human behavior in the workplace from an individual.
- To gain a solid understanding of human behavior in the workplace in the group.
- To learn the concepts of Leadership and power.
- To learn the dynamics of organizational behavior.

UNIT-I INTRODUCTION TO ORGANIZATIONAL BEHAVIOUR 9

Definition, need, and importance of organizational behaviour –Nature and scope –Frame work – Organizational behaviour models.

UNIT-II INDIVIDUAL BEHAVIOUR 9

Personality: types –Factors influencing personality, theories–Types of learners –The learning process –Learning theories –Organizational behaviour modification –Misbehaviour: Types and Management Intervention - Emotions: Emotional Labour –Emotional Intelligence –Theories – Attitudes: Characteristics, Components, Formation, Measurement, and Values - Perceptions: Importance, Factors influencing perception –Interpersonal perception -Impression Management Motivation –importance –Types –Effects on work behavior.

UNIT-III GROUP BEHAVIOUR 9

Organization structure –Formation –Groups in organizations –Influence –Group dynamics – Emergence of informal leaders and working norms –Group decision-making techniques –Team building -Interpersonal relations –Communication –Control.

UNIT-IV LEADERSHIP AND POWER 9

Meaning –Importance–Leadership styles –Theories –Leaders Vs Managers –Sources of power – Power centers –Power and Politics.

UNIT-V DYNAMICS OF ORGANIZATIONAL BEHAVIOUR 9

Organizational culture and climate –Factors affecting organizational climate –Importance of Job satisfaction –Determinants–Measurements – Influence on behavior - Organizational change – Importance –Stability Vs Change – Proactive Vs Reaction change– The change process – Resistance to change – Managing change - Stress - Work Stressors–Prevention and Management of stress – Balancing work and Life - Organizational development –Characteristics and objectives – Organizational effectiveness.

TOTAL : 45 PERIODS

Chairman
BoS / Civil

COURSE OUTCOMES:

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

CO1 : Identify the need and importance of organizational behavior and the framework of organizational models

CO2 : Explain the various learning theories and develop alternative organizational behavior approaches in the workplace

CO3 : Describe the importance of group dynamics and team building.

CO4 : Explore the various leadership styles and politics

CO5 : Explain the dynamics of organizational behaviour with the balance of work life.

REFERENCE BOOKS:

1. Stephen P. Robins, "Organisational Behavior", PHI Learning / Pearson Education, 15th edition,2012.
2. FredLuthans, "Organisational Behavior", McGraw Hill, 12th Edition, 2005.
3. Schermerhorn, Hunt, and Osborn, "Organisational Behavior", John Wiley, 12th Edition, 2011.
4. UdaiPareek, "Understanding Organisational Behaviour", 2nd Edition, Oxford Higher Education, 2008.
5. Mc Shane & Von Glinov, "Organisational Behaviour", 6th Edition, Tata McGraw Hill, 2012.

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc20_mg51/preview
2. https://archive.nptel.ac.in/courses/110/105/110105154/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	1	1	3	2	1	2
CO2	2	1	1	2	3	2
CO3	1	2	2	2	2	3
CO4	1	1	1	2	3	1
CO5	1	1	1	3	2	1

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23CME38	SUPPLY CHAIN MANAGEMENT AND LOGISTICS IN CONSTRUCTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To gain knowledge about construction supply chain management.
- To understand the concepts of strategic perspectives.
- To understand the concepts of integrated data management.
- To understand the concepts of construction logistics and sustainability.
- To understand the concepts of logistics operations.

UNIT-I INTRODUCTION 9

Definition of Logistics and SCM: Evolution, Scope, Importance - Supply chain stages and decision phases process view of a supply chain - Supply chain flows- Examples of supply chains- Competitive and supply chain strategies- Achieving strategic fit- Expanding strategic scope- Drivers of supply chain performance- Framework for structuring drivers -Obstacles to achieving fit.

UNIT-II STRATEGIC PERSPECTIVES 9

Challenge of construction logistics-Aggregating global products for just-in-time delivery to construction sites – Construction Logistics – Supply of bulk materials – Effective management of a construction project supply chain – Construction supply chain management strategy.

UNIT-III INTEGRATED DATA MANAGEMENT 9

Impact of BIM and new data management capabilities on supply chain management in construction – Data management for integrated supply chains in construction

UNIT-IV CONSTRUCTION LOGISTICS AND SUSTAINABILITY 9

Role of logistics in achieving sustainable construction – Resource efficiency benefits of effective logistics

UNIT-V LOGISTICS OPERATIONS 9

Role of the construction logistics manager – Third-party logistics operators in construction – Managing construction logistics for confined sites in urban areas - Consolidation centers in construction logistics – Delivery management systems.

TOTAL : 45 PERIODS

Chairman
BoS / Civil

COURSE OUTCOMES:

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

CO1 : Describe the conceptual and theoretical backgrounds of Supply Chain Management and logistics

CO2 : Apply the strategy in logistics functions ranging from planning to execution and control.

CO3 : Identify the Impact of BIM and new data management capabilities on supply chain management in construction.

CO4 : Analyze the implications of various strategic choices and decide on a better course of action.

CO5 : Understand the role of construction logistic Managers and Delivery management systems.

REFERENCE BOOKS:

1. GregerLundesjö, Supply Chain Management and Logistics in Construction: Delivering Tomorrow's Built Environment, Kogan Page Publishers, 2015.
2. Supply Chain Management, Strategy, Planning, and Operation – Sunil Chopra, Peter Meindl, and Kalra, Pearson Education, 2011
3. A. Ravi Ravindran, Donald P. Warsing, Supply Chain Engineering: Models and Applications, CRC Press, 2012.
4. G Srinivasan, Quantitative Models in Operations and Supply Chain Management, PHI Learning (P) Ltd, New Delhi, 2010
5. David J.Bloomberg, Stephen Lemay and Joe B.Hanna, Logistics, PHI 2010

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/110/106/110106045/
2. https://onlinecourses.nptel.ac.in/noc21_mg45/preview

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	1	3	1	3
CO2	3	3	3	3	2	1
CO3	1	1	1	3	3	2
CO4	3	1	3	3	2	2
CO5	3	3	3	3	2	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23ENA11	ENGLISH FOR RESEARCH PAPER WRITING (Common to all M.E branches)	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very irst-time submission

UNIT-I **INTRODUCTION TO RESEARCH PAPER WRITING** 6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II **PRESENTATION SKILLS** 6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT-III **TITLE WRITING SKILLS** 6

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT-IV **RESULT WRITING SKILLS** 6

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT-V **VERIFICATION SKILLS** 6

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the irst-time submission

TOTAL : 30 PERIODS

Chairman
BoS / S&H

COURSE OUTCOMES:

At the end of the Course the students will able to

CO1	Understand that how to improve your writing skills and level of readability
CO2	Learn about what to write in each section
CO3	Understand the skills needed when writing a Title
CO4	Understand the skills needed when writing the Conclusion
CO5	Ensure the good quality of paper at very first-time submission

REFERENCE BOOKS:

1. Adrian Wallwork, "English for Writing Research Papers", Springer New York Dordrecht Heidelberg London, 2011
2. Day R, "How to Write and Publish a Scientific Paper", Cambridge University Press, 2006.
3. Goldbort R, "Writing for Science", Yale University Press (available on Google Books), 2006.
4. Highman N, "Handbook of Writing for the Mathematical Sciences", SIAM, Highman's book, 1998.

Chairman
BoS / S&H

23CMA12	DISASTER ADMINISTRATION AND MANAGEMENT	L	T	P	C
		2	0	0	0

Course Objectives:

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

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, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

Total Hours **30**

Chairman
BoS / Civil

COURSE OUTCOMES

CO's	OUTCOMES
CO1	Ability to summarize basics of disaster
CO2	Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response
CO3	Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives
CO4	Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
CO5	Ability to develop the strengths and weaknesses of disaster management approaches

Reference Books:

1. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep& Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall OfIndia, New Delhi,2001.

Chairman
BoS / Civil

23MSA13	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

UNIT-I HISTORY OF MAKING OF THE INDIAN CONSTITUTION 5

History, Drafting Committee, (Composition & Working)

UNIT-II PHILOSOPHY OF THE INDIAN CONSTITUTION 5

Preamble, Salient Features.

UNIT-III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES 5

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-IV ORGANS OF GOVERNANCE 5

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT-V LOCAL ADMINISTRATION 5

District's Administration head: Role and ImportanceMunicipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI ELECTION COMMISSION 5

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women

TOTAL : 30 PERIODS

Chairman
BoS / MBA

COURSE OUTCOMES:

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

CO1 : Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

CO2 : Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

CO3 : Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru

CO4 : Discuss the passage of the Hindu Code Bill of 1956

CO5 : The eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

REFERENCE BOOKS:

1. The Constitution of India,1950(Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Chairman
BoS / MBA

23TAA14 **நற்றமிழ் இலக்கியம்** L T P C
2 0 0 0

(அனைத்து M.E பாடப்பிரிவுகளுக்கும் பொதுவானது)

அலகு - I **சங்க இலக்கியம்** 6

1. தமிழின் துவக்க நூல் தொல்கொப்பியம்

– எழுத்து, சொல், பொருள்

2. அகநானூறு (82)

- இயற்கை இன்னிசை அரங்கம்

3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி

4. புறநானூறு (95,195)

- போரை நிறுத்திய ஔவையார்

அலகு - II **அறநெறித் தமிழ்** 6

1. அறநெறி வகுத்த திருவள்ளுவர்

- அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புரவறிதல், ஈகை, புகழ்

2. பிற அறநூல்கள் - இலக்கிய மருந்து

– ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை

(தூய்மையை வலியுறுத்தும் நூல்)

அலகு - III **இரட்டைக் காப்பியங்கள்** 6

1. கண்ணகியின் புரட்சி

- சிலப்பதிகார வழக்குரை காதை

2. சமூக சேவை, இலக்கியம் மணிமேகலை

- சிறைக் கோட்டம் அறக்கூட்டமாகிய காதை

அலகு - IV **அருள்நெறித் தமிழ்** 6

1. சிறுபாணாற்றுப்படை

- பாரி முல்லைக்குத் தேர் கொடுத்தது, பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான் ஔவைக்கு நெல்லிக்கனி கொடுத்தது, அரசர் பண்புகள்

2. நற்றிணை

- அன்னைக்குரிய புன்னை சிறப்பு

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3. திருமந்திரம் (617, 618)

- இயமம் நியமம் விதிகள்

4. தர்மச்சாலையை நிறுவிய வள்ளலார்

5. புறநானூறு

- சிறுவனே வள்ளலானான்

6. அகநானூறு (4) - வண்டு

நற்றிணை (11) - நண்டு

கலித்தொகை (11) - யானை, புறா

ஐந்திணை 50 (27) - மான்

ஆகியவை பற்றிய செய்திகள்

அலகு - V **நவீன தமிழ் இலக்கியம்** 6

1. உரைநடைத் தமிழ்,

- தமிழின் முதல் புதினம்,

- தமிழின் முதல் சிறுகதை,

- கட்டுரை இலக்கியம்,

- பயண இலக்கியம்,

- நாடகம்.

2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும்,

3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும்,

4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,

5. அறிவியல் தமிழ்,

6. இணையத்தில் தமிழ்,

7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

மொத்தம்: 30 பாடவேளைகள்

தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University) - www.tamilvu.org
2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia) -https://ta.wikipedia.org
3. தீம்புர ஆதீன வெளியீடு
4. வாழ்வியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

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5. தமிழ்கலைக் களஞ்சியம் - தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

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23CM011	SUSTAINABLE CONSTRUCTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge about sustainable construction and to understand the concepts of sustainable materials, energy calculations, green buildings and environmental effects.

UNIT-I INTRODUCTION 8

Introduction and definition of Sustainability - Carbon cycle - role of construction material: concrete and steel, etc. - CO2 contribution from cement.

UNIT-II MATERIALS USED IN SUSTAINABLE CONSTRUCTION 8

Construction materials and indoor air quality - No/Low cement concrete - Recycled and manufactured aggregate - Role of QC - Life cycle and sustainability.

UNIT-III ENERGY CALCULATIONS 9

Components of embodied energy - calculation of embodied energy for construction materials - Energy concept and primary energy - Embodied energy via-a-vis operational energy in conditioned building - Life Cycle energy use.

UNIT-IV GREEN BUILDINGS 10

Control of energy use in building - ECBC code, codes in neighboring tropical countries - OTTV concepts and calculations – Features of LEED and TERI – Griha ratings - Role of insulation and thermal properties of construction materials - influence of moisture content - Performance ratings of green buildings - Zero energy building.

UNIT-V ENVIRONMENTAL EFFECTS 10

Non-renewable sources of energy and Environmental aspects – energy norm, coal, oil, natural gas - Nuclear energy - Global temperature, Green house effects, global warming - Acid rain: Causes, and control methods - Regional impacts of temperature change.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 : Summarize the various sustainable materials used in construction.

CO2 : Explain the method of estimating the amount of energy required for building.

CO3 : Interpret the features of LEED, TERI and GRIHA ratings of buildings.

CO4 : Relate the concept and performance of zero energy buildings

CO5 : Select less carbon emission materials for construction

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BoS / Civil

REFERENCE BOOKS:

1. Charles J Kibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition, Wiley Publishers 2016.
2. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell, UK, 2016.
3. Craig A. Langston & Grace K.C. Ding, Sustainable Practices in the Built Environment, Butterworth Heinemann Publishers, 2011.
4. William P Spence, Construction Materials, Methods & Techniques (3e), Yesdee Publication Pvt. Ltd, 2012.
5. New Building Materials and Construction World magazine

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/105/102/105102195/
2. https://nptel.ac.in/courses/124107011

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	3	1	2	1
CO2	3	2	3	2	2	2
CO3	3	3	2	1	3	1
CO4	3	3	3	2	3	2
CO5	3	1	2	2	3	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23CM012	PROJECT SAFETY MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study and understand the various safety concepts and requirements applied to construction projects.

UNIT-I CONSTRUCTION ACCIDENTS 9

Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications.

UNIT-II SAFETY PROGRAMMES 9

Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives.

UNIT-III CONTRACTUAL OBLIGATIONS 9

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping - Occupational Safety and Health Administration Manuals, Laws and Act - Indian Practices.

UNIT-IV DESIGNING FOR SAFETY 9

Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers – Top Management Practices, Company Activities – Safety Personnel – Sub contractual Obligation – Project Coordination and Safety Procedures – Workers Compensation.

UNIT-V OWNERS' AND DESIGNERS' OUTLOOK 9

Owners and Designers – Roles and responsibility in ensuring safety – Preparedness – Role of the designer in ensuring safety – Safety clause in the design document.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 : Develop knowledge on accidents and their causes.
CO2 : Develop knowledge about safety programs and job-site safety assessments.
CO3 : Apply the knowledge of contractual obligations.
CO4 : Explain about designing for safety and safety procedures.
CO5 : Develop the knowledge of owners' and designers' responsibilities.

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REFERENCE BOOKS:

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997.
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.
3. Sathyanarayanan Rajendran and Mandi Kime, Construction Project Safety-Management Best-Practices Handbook, 2013.
4. Safety, Health and Environmental Handbook, CPWD, 2019.
5. Bhattacharjee S.K. Safety Management in Construction (Principles and Practice), Khanna Publishers, New Delhi 2011

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/110/104/110104073/
2. https://archive.nptel.ac.in/courses/110/105/110105094/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	1	1	1	2	2	2
CO2	2	1	2	2	2	2
CO3	1	1	1	2	1	2
CO4	1	1	2	2	2	2
CO5	1	1	2	2	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23SE011	PREFABRICATED STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the design principles, analysis and design of Prefabricated structures.

UNIT-I **DESIGN PRINCIPLES** **9**

General Civil Engineering requirements, specific requirements for planning and layout of prefabrication plant. IS Code specifications. Modular co-ordination, standardization, Disuniting of Prefabricates, production, transportation, erection, stages of loading, safety factors, material properties, Deflection control.

UNIT-II **REINFORCED CONCRETE** **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.

UNIT-III **FLOORS, STAIRS AND ROOFS** **9**

Types of floor slabs, analysis and design example of cored and panel types and two-way systems, Design analysis for product manufacture, handling and erection, staircase slab, types of roof slabs, 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** **9**

Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, Hoisting and placing, load transfer from floor to wall panels, vertical loads, Eccentricity and stability of wall panels, Design Curves, types of wall joints and design, Leak prevention, joint sealants, sandwich wall panels, Lateral load resistance, types of shear walls, 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. Cylindrical, Folded plate, Erection and jointing of components in industrial buildings.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1 : Explain the design principles involved in prefabrication
CO2 : Detail the different types of connection
CO3 : Design for stripping forces during manufacture
CO4 : Determine the forces in shear walls
CO5 : Identify the different roof trusses used in industrial buildings

REFERENCE BOOKS:

1. Hubert Bachmann and Alfred Steinle, Precast Concrete Structures, 2012.
1. Koncz. T. Manual of Precast Concrete Construction, Vol.I II and III & IV Bauverlag, GMBH, 1971.
2. Laszlo Mokk, Prefabricated Concrete for Industrial and Public Structures, AkademiaiKiado, Budapest, 2007.
3. Lewicki. B, Building with Large Prefabricates, Elsevier Publishing Company, 1988.
4. Structural Design manual, Precast concrete connection details, Society for studies in the use of Precast concrete, Netherland BetorVerlag, 2009.

E-RESOURCES:

1. https://nptel.ac.in/courses/124105013
2. https://archive.nptel.ac.in/courses/124/105/124105013/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	2
CO2	3	2	2	3	2	3
CO3	3	2	3	3	3	3
CO4	2	1	3	3	3	3
CO5	2	2	3	3	3	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23SE012	MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the damages, repair and rehabilitation of structures

UNIT-I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, Repair and Rehabilitation, retrofit and strengthening, need for rehabilitation of structures- Service life behaviour - importance of Maintenance, causes and effects of deterioration.

UNIT-II STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete based on Strength , Durability and Microstructure of concrete - Cracks- different types, causes – Effects due to Environment, Fire , Earthquake, Corrosion of steel in concrete, Mechanism, quantification of corrosion damage.

UNIT-III REPAIR MATERIALS AND SPECIAL CONCRETES 9

Special mortars and concretes- Polymer Concrete and Grouting materials- Bonding agents-Latex emulsions, Epoxy bonding agents, Protective coatings, FRP sheets.

UNIT-IV PROTECTION METHODS AND STRUCTURAL HEALTH MONITORING 9

Concrete protection methods – reinforcement protection methods- cathodic protection - Sacrificial anode – Corrosion inhibitors, concrete coatings-Corrosion resistant steels, Coatings to reinforcement, Structural health monitoring.

UNIT-V REPAIR, RETROFITTING AND DEMOLITION OF STRUCTURES 9

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Repair to dormant cracks. Repair of various corrosion damaged of structural elements (slab, beam and columns), Strengthening Methods for Structural Elements. Engineered Demolition -Case studies.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1 : Explain the importance of maintenance assessment and repair strategies

CO2 : Acquire knowledge of strength and durability properties and their effects due to climate and temperature.

CO3 : Gain knowledge of recent developments in repair

CO4 : Explain the techniques for repair and protection methods

CO5 : Explain the repair, rehabilitation and retrofitting of structures and demolition methods.

REFERENCE BOOKS:

1. Dodge Woodson, Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann, Elsevier,New Delhi 2012
2. DovKominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt.Ltd., 2001
3. Ravishankar.K.,Krishnamoorthy.T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.
4. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
5. Hand Book on "Repair and Rehabilitation of RCC Buildings" – Director General works CPWD , Govt of India , New Delhi – 2002
6. BS EN 1504 - Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/105/106/105106202/
2. https://archive.nptel.ac.in/courses/105/105/105105213/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PSO1	PSO2	PSO3
1	3	-	2	3	2	2
2	3	1	-	2	2	1
3	3	-	2	2	3	1
4	3	1	-	3	2	2
5	3	2	1	2	2	1
Avg	3	1.33	1.67	2.40	2.20	1.40

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Civil

23MSO31	SUSTAINABLE MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

To provide students with fundamental knowledge of the notion of corporate sustainability. To determine how organizations impacts on the environment and socio-technical systems, the relationship between social and environmental performance and competitiveness, the approaches and methods.

UNIT-I MANAGEMENT OF SUSTAINABILITY 9

Management of sustainability -rationale and political trends: An introduction to sustainability management, International and European policies on sustainable development, theoretical pillars in sustainability management studies.

UNIT-II CORPORATE SUSTAINABILITY AND RESPONSIBILITY 9

Corporate sustainability parameter, corporate sustainability institutional framework, integration of sustainability into strategic planning and regular business practices, fundamentals of stakeholder engagement.

UNIT-III SUSTAINABILITY MANAGEMENT: STRATEGIES AND APPROACHES 9

Corporate sustainability management and competitiveness: Sustainability-oriented corporate strategies, markets and competitiveness, Green Management between theory and practice, Sustainable Consumption and Green Marketing strategies, Environmental regulation and strategic postures; Green Management approaches and tools; Green engineering: clean technologies and innovation processes; Sustainable Supply Chain Management and Procurement.

UNIT-IV SUSTAINABILITY AND INNOVATION 9

Socio-technical transitions and sustainability, Sustainable entrepreneurship, Sustainable pioneers in green market niches, Smart communities and smart specializations.

UNIT-V SUSTAINABLE MANAGEMENT OF RESOURCES, COMMODITIES AND COMMONS 9

Energy management, Water management, Waste management, Wild Life Conservation, Emerging trends in sustainable management, Case Studies.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1 : An understanding of sustainability management as an approach to aid in evaluating and minimizing environmental impacts while achieving the expected social impact.

CO2 : An understanding of corporate sustainability and responsible Business Practices

CO3 : Knowledge and skills to understand, to measure and interpret sustainability performances.

CO4 : Knowledge of innovative practices in sustainable business and community management

CO5 : Deep understanding of sustainable management of resources and commodities

REFERENCE BOOKS:

1. Daddi, T., Iraldo, F., Testa, Environmental Certification for Organizations and Products: Management, 2015
2. Christian N. Madu, Handbook of Sustainability Management 2012
3. Petra Molthan-Hill, The Business Student's Guide to Sustainable Management: Principles and Practice, 2014
4. Margaret Robertson, Sustainability Principles and Practice, 2014

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_mg94/preview
2. https://archive.nptel.ac.in/courses/110/101/110101153/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	1	2	2
CO2	3	2	2	2	1	2
CO3	3	3	1	2	2	3
CO4	3	3	2	1	1	2
CO5	3	3	2	1	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / MBA

23MSO32	MICRO AND SMALL BUSINESS MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

To familiarize students with the theory and practice of small business management.

To learn the legal issues faced by small business and how they impact operations.

UNIT-I INTRODUCTION TO SMALL BUSINESS 9

Creation, Innovation, entrepreneurship and small business - Defining Small Business –Role of Owner – Manager – government policy towards small business sector –elements of entrepreneurship –evolution of entrepreneurship –Types of Entrepreneurship – social, civic, corporate - Business life cycle - barriers and triggers to new venture creation – process to assist start ups – small business and family business.

UNIT-II SCREENING THE BUSINESS OPPORTUNITY AND FORMULATING THE BUSINESS PLAN 9

Concepts of opportunity recognition; Key factors leading to new venture failure; New venture screening process; Applying new venture screening process to the early stage small firm Role planning in small business – importance of strategy formulation – management skills for small business creation and development.

UNIT-III BUILDING THE RIGHT TEAM AND MARKETING STRATEGY 9

Management and Leadership – employee assessments – Tuckman's stages of group development - The entrepreneurial process model - Delegation and team building - Comparison of HR management in small and large firms - Importance of coaching and how to apply a coaching model. Marketing within the small business - success strategies for small business marketing - customer delight and business generating systems, - market research, - assessing market performance - sales management and strategy - the marketing mix and marketing strategy.

UNIT-IV FINANCING SMALL BUSINESS 9

Main sources of entrepreneurial capital; Nature of 'bootstrap' financing - Difference between cash and profit - Nature of bank financing and equity financing - Funding-equity gap for small firms. Importance of working capital cycle - Calculation of break-even point - Power of gross profit margin- Pricing for profit - Credit policy issues and relating these to cash flow management and profitability.

UNIT-V VALUING SMALL BUSINESS AND CRISIS MANAGEMENT 9

Causes of small business failure - Danger signals of impending trouble - Characteristics of poorly performing firms - Turnaround strategies - Concept of business valuation - Different valuation measurements - Nature of goodwill and how to measure it - Advantages and disadvantages of buying an established small firm - Process of preparing a business for sale. TO

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1 : Familiarise the students with the concept of small business

CO2 : In depth knowledge on small business opportunities and challenges

CO3 : Ability to devise plans for small business by building the right skills and marketing strategies

CO4 : Identify the funding source for small start ups

CO5 : Business evaluation for buying and selling of small firms

REFERENCE BOOKS:

1. Hankinson,A.(2000). "The key factors in the profile of small firm owner-managers that influence business performance. The South Coast Small Firms Survey, 1997-2000." Industrial and Commercial Training 32(3):94-98.
2. Parker,R.(2000). "Small is not necessarily beautiful: An evaluation of policy support for small and medium-sized enterprise in Australia." Australian Journal of Political Science 35(2):239-253.
3. Journal articles on SME's

E-RESOURCES:

1. https://nptel.ac.in/courses/127105007
2. https://onlinecourses.swayam2.ac.in/imb23_mg56/preview

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	1	1	-	-
CO2	3	3	3	3	2	3
CO3	3	3	2	2	3	3
CO4	3	2	2	2	1	1
CO5	3	2	2	3	2	1

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / MBA

23MSO33 **INTELLECTUAL PROPERTY RIGHTS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

To understand intellectual property rights and its valuation.

UNIT-I **INTRODUCTION** **9**

Intellectual property rights - Introduction, Basic concepts, Patents, Copyrights, Trademarks, Trade Secrets, Geographic Indicators; Nature of Intellectual Property, Technological Research, Inventions and Innovations, History - the way from WTO to WIPO, TRIPS.

UNIT-II **PROCESS** **9**

New Developments in IPR, Procedure for grant of Patents, TM, GIs, Patenting under Patent Cooperation Treaty, Administration of Patent system in India, Patenting in foreign countries.

UNIT-III **STATUTES** **9**

International Treaties and conventions on IPRs, The TRIPs Agreement, PCT Agreement, The Patent Act of India, Patent Amendment Act (2005), Design Act, Trademark Act, Geographical Indication Act, Bayh- Dole Act and Issues of Academic Entrepreneurship.

UNIT-IV **STRATEGIES IN INTELLECTUAL PROPERTY** **9**

Strategies for investing in R&D, Patent Information and databases, IPR strength in India, Traditional Knowledge, Case studies.

UNIT-V **MODELS** **9**

The technologies Know-how, concept of ownership, Significance of IP in Value Creation, IP Valuation and IP Valuation Models, Application of Real Option Model in Strategic Decision Making, Transfer and Licensing.

TOTAL : 45 PERIODS

Chairman
BoS / MBA

COURSE OUTCOMES:

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

CO1 : Understanding of intellectual property and appreciation of the need to protect it

CO2 : Awareness about the process of patenting

CO3 : Understanding of the statutes related to IPR

CO4 : Ability to apply strategies to protect intellectual property

CO5 : Ability to apply models for making strategic decisions related to IPR

REFERENCE BOOKS:

1. V. Sople Vinod, Managing Intellectual Property by (Prentice hall of India Pvt.Ltd), 2006.
2. Intellectual Property rights and copyrights, EssEss Publications.
3. Primer, R. Anita Rao and Bhanoji Rao, Intellectual Property Rights, Lastain Book company.
4. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2006.
5. WIPO Intellectual Property Hand book.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/110/105/110105139/
2. https://nptel.ac.in/courses/109106137

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	3	2	3
CO2	3	3	2	3	1	3
CO3	3	3	3	3	2	3
CO4	3	3	3	2	1	3
CO5	3	3	3	2	2	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / MBA

23MSO34	ETHICAL MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

To help students develop knowledge and competence in ethical management and decision making in organizational contexts.

UNIT-I ETHICS AND SOCIETY 9

Ethical Management- Definition, Motivation, Advantages-Practical implications of ethical management. Managerial ethics, professional ethics, and social Responsibility-Role of culture and society's expectations- Individual and organizational responsibility to society and the community.

UNIT-II ETHICAL DECISION MAKING AND MANAGEMENT IN A CRISIS 9

Managing in an ethical crisis, the nature of a crisis, ethics in crisis management, discuss case studies, analyze real-world scenarios, develop ethical management skills, knowledge, and competencies. Proactive crisis management.

UNIT-III STAKEHOLDERS IN ETHICAL MANAGEMENT 9

Stakeholders in ethical management, identifying internal and external stakeholders, nature of stakeholders, ethical management of various kinds of stakeholders: customers (product and service issues), employees (leadership, fairness, justice, diversity) suppliers, collaborators, business, community, the natural environment (the sustainability imperative, green management, Contemporary issues).

UNIT-IV INDIVIDUAL VARIABLES IN ETHICAL MANJAGEMENT 9

Understanding individual variables in ethics, managerial ethics, concepts in ethical psychologyethical awareness, ethical courage, ethical judgment, ethical foundations, ethical emotions/intuitions/intensity. Utilization of these concepts and competencies for ethical decisionmaking and management

UNIT-V PRACTICAL FIELD-GUIDE, TECHNIQUES AND SKILLS 9

Ethical management in practice, development of techniques and skills, navigating challenges and dilemmas, resolving issues and preventing unethical management proactively. Role modelling and creating a culture of ethical management and human flourishing.

TOTAL : 45 PERIODS

Chairman
BoS / MBA

COURSE OUTCOMES:

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

CO1 : Role modelling and influencing the ethical and cultural context

CO2 : Respond to ethical crises and proactively address potential crises situations.

CO3 : Understand and implement stakeholder management decisions.

CO4 : Develop the ability, knowledge, and skills for ethical management

CO5 : Develop practical skills to navigate, resolve and thrive in management situations

REFERENCE BOOKS:

1. Brad Agle, Aaron Miller, Bill O' Rourke, The Business Ethics Field Guide: the essential companion to leading your career and your company, 2016.
2. Steiner & Steiner, Business, Government & Society: A managerial Perspective, 2011.
3. Lawrence & Weber, Business and Society: Stakeholders, Ethics, Public Policy, 2020.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/110/105/110105079/
2. https://archive.nptel.ac.in/courses/110/105/110105138/

CO's – PO's & PSO's MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	3	2	3
CO2	-	3	2	3	1	3
CO3	3	3	3	3	2	3
CO4	3	3	3	2	1	3
CO5	3	3	3	2	2	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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