

M.E- CONSTRUCTION ENGINEERING AND MANAGEMENT

(REGULATIONS 2020)

Vision of the Institution

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

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

Vision of the Department / Programme: (Civil Engineering)

DV	To impart knowledge and excellence in Civil Engineering and Technology with global perspectives to our students and to make them ethically strong engineers to create conducive environment.
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Mission of the Department / Programme: (Civil Engineering)


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

Programme Educational Objectives (PEOs): (Civil Engineering)


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

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


Program Outcomes (POs)	
PO1	An ability to independently carry out research / investigation and development work to solve practical problems.
PO2	An ability to write and present a substantial technical report / document
PO3	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.
Program Specific Outcomes (PSOs)	
PSO1	Design, integrated and administrate new construction problems using technology and literature.
PSO2	Contribute core Universal values in the field of construction management and social good in the community.

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode – 637 215						CURRICULUM PG R - 2020		
Department		Civil Engineering								
Programme		M.E – Construction Engineering and Management								
SEMESTER – I										
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks			
			L	T	P	C	CA	ES	Total	
THEORY										
1.	MA20131	Statistical Methods and Queuing Theory	3	0	0	3	30	70	100	
2.	CN20112	Modern Construction Materials	3	0	0	3	30	70	100	
3.	CN20113	Construction Equipment	3	0	0	3	30	70	100	
4.	CN20114	Contract Laws and Regulations	3	0	0	3	30	70	100	
5.		Professional Elective - I	3	0	0	3	30	70	100	
6.		Professional Elective - II	3	0	0	3	30	70	100	
PRACTICAL										
7.	CN20121	Construction Engineering Laboratory	0	0	3	2	50	50	100	
8.	CN20122	Technical Presentation - I	0	2	0	1	50	50	100	
Total			18	02	03	21	800			

SEMESTER - II										
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks			
			L	T	P	C	CA	ES	Total	
THEORY										
1.	CN20211	Advanced Construction Techniques	3	0	0	3	30	70	100	
2.	CN20212	Project Formulation and Appraisal	3	0	0	3	30	70	100	
3.	CN20213	Construction Planning, Scheduling and Control	3	0	0	3	30	70	100	
4.	CN20214	Safety Practices and Management	3	0	0	3	30	70	100	
5.		Professional Elective - III	3	0	0	3	30	70	100	
6.		Professional Elective - IV	3	0	0	3	30	70	100	
PRACTICAL										
7.	CN20221	Advanced Computing Techniques Laboratory	0	0	3	2	50	50	100	
8.	CN20222	Technical Presentation - II	0	2	0	1	50	50	100	
Total			18	02	03	21	800			

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Department		Civil Engineering							
Programme		M.E – Construction Engineering and Management							
SEMESTER – III									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P		C	CA	ES
THEORY									
1.		Professional Elective -V	3	0	0	3	30	70	100
2.		Professional Elective -VI	3	0	0	3	30	70	100
3.		Open Elective	3	0	0	3	30	70	100
4.	CN203A1	Audit Course	2	0	0	0	50	50	100
PRACTICAL									
5.	CN20321	Project Work – Phase I	0	0	12	6	50	50	100
6.	CN20322	Practical Training*	0	0	20	1	50	50	100
Total			9	0	32	16	600		

SEMESTER - IV									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P		C	CA	ES
PRACTICAL									
1.	CN20421	Project Work – Phase II	0	0	30	12	50	50	100
Total			0	0	30	12	100		

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	Department	Civil Engineering	
Programme	M.E – Construction Engineering and Management		
List of Electives			

ELECTIVES (SEMESTER – I)									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P		C	CA	ES
1.	CN20161	Management information system	3	0	0	3	30	70	100
2.	CN20162	Disaster management	3	0	0	3	30	70	100
3.	CN20163	Research Methodology and Intellectual Property Rights	3	0	0	3	30	70	100
4.	CN20164	Business Economics and Finance Management	3	0	0	3	30	70	100
5.	CN20165	Pavement Engineering	3	0	0	3	30	70	100
6.	CN20166	Quantitative Techniques in Management	3	0	0	3	30	70	100

ELECTIVES (SEMESTER – II)									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P		C	CA	ES
1.	CN20261	GIS in Construction Engineering and Management	3	0	0	3	30	70	100
2.	CN20262	Modern Structural Materials and System Design	3	0	0	3	30	70	100
3.	CN20263	Personnel Management in Construction	3	0	0	3	30	70	100
4.	CN20264	Construction Project Management	3	0	0	3	30	70	100
5.	CN20265	Energy Conservation Techniques in Building Construction and Maintenance	3	0	0	3	30	70	100
6.	CN20266	Tall Structures	3	0	0	3	30	70	100

ELECTIVES (SEMESTER – III)									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P	C	CA	ES	Total
1.	CN20361	Prefabricated Structures	3	0	0	3	30	70	100
2.	CN20362	Computer Application in Construction Engineering and Planning	3	0	0	3	30	70	100
3.	CN20363	Quality Control and Assurance in Construction	3	0	0	3	30	70	100
4.	CN20364	Resource Management and Control in Construction	3	0	0	3	30	70	100
5.	CN20365	Shoring, Scaffolding and Formwork	3	0	0	3	30	70	100
6.	CN20366	Building Management Systems	3	0	0	3	30	70	100

LIST OF OPEN ELECTIVES (SEMESTER – III)									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P	C	CA	ES	Total
1.	CN20OE1	Energy Efficient Buildings	3	0	0	3	30	70	100
2.	CN20OE2	Economics and Finance management in construction	3	0	0	3	30	70	100
3.	CN20OE3	Stress Management	3	0	0	3	30	70	100
4.	CN20OE4	Materials Management	3	0	0	3	30	70	100
5.	CN20OE5	Building Acoustics and Noise control	3	0	0	3	30	70	100

AUDIT COURSE (SEMESTER – III)									
Sl.No.	Course Code	Course Name	Hours/ Week			Credit	Maximum Marks		
			L	T	P	C	CA	ES	Total
1.	CN203A1	English for Research paper writing	3	0	0	3	50	50	100

SEMESTER – I

MA20131	STATISTICAL METHODS AND QUEUEING THEORY	L	T	P	C
		3	0	0	3

Course Outcomes: On Completion of this course , the student will be able to	Cognitive level
CO1: Solve the one dimensional random variable and Distributions.	Understand
CO2: Explain and estimate the values in Estimation theory.	Remember
CO3: Acquire the knowledge of the samples by using various methods in testing of hypothesis	Evaluate
CO4: Interpret variances by design of experiments to obtain inferences.	Understand
CO5: Apply the concepts of queuing models in engineering fields.	Apply

UNIT – I ONE DIMENSIONAL RANDOM VARIABLE [9]

Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Uniform and Normal distributions – Function of a Random Variable.

UNIT – II ESTIMATION THEORY [9]

Estimation of parameters – Unbiased Estimator - Maximum Likelihood Estimation – Curve fitting by Principle of least squares - linear trend $y = ax + b$ and second degree parabola $y = ax^2 + bx + c$ – Regression equations.

UNIT – III TESTING OF HYPOTHESIS [9]

Sampling distributions - Type I and Type II errors – Test of significance for attributes: test for difference between two proportions – Test of significance for small sample (Student's t- test) - Test of significance for large samples (z-test) - Test of significance of variance (F- test) – Chi-Square test for Independence and attributes.

UNIT – IV DESIGN OF EXPERIMENTS [9]

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

UNIT – V QUEUEING MODELS [9]

Poisson Process – Applications of Queuing Models – characteristics of Queuing Models – Kendall's notation - Markovian queues – Model I – (M/M/1) : (∞ /FIFO) Single Server with infinite capacity – Little's formula - Model II - (M/M/C) : (∞ /FIFO) Multi Server with infinite capacity - Model III – (M/M/1) : (N /FIFO) Single Server with finite capacity - Model IV – (M/M/C) : (N /FIFO) Multi Server with finite capacity Models.

Total = 45 Periods**Reference Books:**

- 1 Gupta, S.P., Statistical Methods, Sultan Chand & Sons, New Delhi, Thirty First Edition, 2012.
- 2 Gupta, P.K. and Man Mohan., Problems in Operation Research, Sultan Chand & Sons, New Delhi, Eleventh Edition 2007.
- 3 Hira, and Gupta., Problems in Operations Research, S.Chand and Co, New Delhi, Eighth Edition, 2015.
- 4 Sharma,J.K., Operation Research, Mac Millan India Pvt. Ltd., New Delhi, Seventh Edition,2007.

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

SEMESTER - I

CN20112	MODERN CONSTRUCTION MATERIALS	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to

	Cognitive Level
CO1: Apply knowledge of modern materials in production of variety of concrete.	Apply
CO2: Apply different type of steel and insulating materials in constructions.	Apply
CO3: Relate data's of composites and chemicals in production of modern concrete.	Remember
CO4: Recognize the use of modern construction materials.	Understand
CO5: Make use of intelligent materials in constructions.	Remember

UNIT - I SPECIAL CONCRETES [09]

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

UNIT - II METALS [09]

Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminium and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.

UNIT - III COMPOSITES [09]

Types of Plastics – Properties & Manufacturing process – Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP.

UNIT - IV OTHER MATERIALS [09]

Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application.

UNIT - V SMART AND INTELLIGENT MATERIALS [09]

Types & Differences between Smart and Intelligent Materials – Special features –Case studies showing the applications of smart & Intelligent Materials.

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

Reference Books :

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

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - I

CN20113	CONSTRUCTION EQUIPMENT	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Explain the principles of effective utilization of equipment.	Understand
CO2: Explain the basics of construction equipment.	Understand
CO3: Acquire knowledge about the materials handling in construction site.	Remember
CO4: Recognize the productivity of equipment management.	Apply
CO5: Perceive about the management of equipment and their utilization.	Understand

UNIT - I EQUIPMENT FOR EARTHWORK [9]

Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers.

UNIT - II OTHER CONSTRUCTION EQUIPMENT [9]

Equipment for Dredging, Trenching, Tunnelling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment – Equipment for Demolition.

UNIT - III MATERIALS HANDLING EQUIPMENT [9]

Forklifts and related equipment - Portable Material Bins – Conveyors - Hauling Equipment.

UNIT - IV EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING [9]

Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment – Transporters.

UNIT - V CONSTRUCTION EQUIPMENT MANAGEMENT [9]

Identification – Resource Planning - Equipment Management in Projects - Maintenance Management – Replacement - Cost Control of Equipment - Depreciation Analysis – Safety Management.

Total = 45 Periods

Reference Books :

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

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - I

CN20114	CONTRACT LAWS AND REGULATIONS	L	T	P	C
		3	0	0	3

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

CO1:	Examine the elements of concluding, and administering contracts	Analyse
CO2:	Determine about the procedure for tendering and documentation.	Evaluate
CO3:	Realize awareness on arbitrations and legal procedures	Understand
CO4:	Identify about the labour requirements in terms of tax and cost analysis.	Apply
CO5:	Analyse about labour regulations and their impact on managing of contracts	Analyse

UNIT - I CONSTRUCTION CONTRACTS [9]

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

UNIT - II TENDERS [9]

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Transparency in Tamilnadu Tenders Act – eTender

UNIT - III ARBITRATION [9]

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs.

UNIT - IV LEGAL REQUIREMENTS [9]

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

UNIT - V LABOUR REGULATIONS [9]

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen’s Compensation Act(1923) – Indian Factory Act(1881) – Tamilnadu Factory Act(1950) – Child Labour Act(1986) - Other Labour Laws.

Total = 45 Periods

Reference Books :

- 1 Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M. Tripathi Private Ltd., Bombay, Fourth Edition, 2000.
- 2 Jimmie Hinze., Construction Contract, McGraw Hill, New Delhi, Third Edition, 2010.
- 3 Kwaku, A., Tenah, P.E. and Jose M.Guevara, P.E., Fundamentals of Construction Management and Organisation, Prentice Hall, New Jersey, First Edition, 1985.
- 4 <http://nptel.ac.in/courses/105103093>.

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

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SEMESTER - I

CN20121	CONSTRUCTION ENGINEERING LABORATORY	L	T	P	C
		0	0	3	2

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Explain the high performance Concrete mix design procedure as per ACI IS and BS method	Apply
CO2: Explain about the method of testing of workability of concrete using admixtures by Slump test.	Apply
CO3: Estimate the properties of fresh and hardened concrete	Apply
CO4: Outline the behaviour of materials under compression and tension	Understand
CO5: Enumerate the concrete quality through NDT	Analyse

List of Experiments:

1. Mix Design of Concrete as per Indian Standards (IS), American Concrete Institute (ACI) ,BS Method for high performance concrete
2. Mix Design of self-compacting concrete as per European Federation of National Associations Representing for Concrete (EFNARC) guidelines.
3. Flow characteristics of self-compacting concrete
4. Effect of minerals in concrete at fresh and hardened state with relevance to workability, strength and durability.
5. Effect of chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
6. Permeability tests on hardened concrete
7. Determination of in-situ strength and quality of concrete using
 - Rebound hammer
 - Ultrasonic pulse velocity tester

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

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - I

CN20122

TECHNICAL PRESENTATION - I

L	T	P	C
0	2	0	1

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Identify the area of interest of the student.

Apply

CO2: Identify the thrust areas by referring journals, conference proceedings etc.

Apply

CO3: Familiarize with literature collection.

Understand

CO4: Demonstrate his/her own ideas in the current topic.

Understand

CO5: Perceive about report writing and presentation.

Evaluate

- The students have to refer the journals and conference proceedings and collect the literature.
- The student can select a course oriented topic.
- The students have to collect at least 30 research papers published in the last decades.
- Using OHP / Power Point, the student has to make presentation for 20 minutes followed by 10 minutes discussion.
- The student has to make five presentations in the semester.
- The student has to write a technical report for about 30 - 50 pages (Title page, One page Abstract, Review of Research paper under various sub - headings, concluding remarks and list of references).
- The technical report has to be submitted to the course coordinator one week before the final presentation.

Total = 30 Periods

SEMESTER - II

CN20211

ADVANCED CONSTRUCTION TECHNIQUES

L	T	P	C
3	0	0	3

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

CO1: Explain the various processes and techniques involved in sub-structure construction.

Understand

CO2: Grasp the different methods used in super-structure construction.

Understand

CO3: Assess the construction process of special structures and offshore structures with advanced machinery and equipment.

Analyse

CO4: Comprise idea about the rehabilitation techniques carried out for strengthening of a structure.

Remember

CO5: Explain about the advanced demolition techniques carried out for dismantling a structure.

Evaluate

UNIT - I SUB-STRUCTURE CONSTRUCTION**[10]**

Box jacking - pipe jacking - Under water construction of diaphragm walls and basement - Tunnelling techniques - piling techniques - driving well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction - well points - dewatering and stand by plant equipment for underground open excavation.

UNIT - II SUPER-STRUCTURE CONSTRUCTION FOR BUILDINGS**[10]**

Vacuum dewatering of concrete flooring – concrete paving technology – techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – launching techniques – suspended form work – erection techniques of tall structures, large span structures – launching techniques for heavy decks – insitu pre stressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures.

UNIT - III CONSTRUCTION OF SPECIAL STRUCTURES**[10]**

Erection of lattice towers and rigging of transmission line structures – construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges – launching and pushing of box decks – Advanced construction techniques for offshore structures – construction sequence and methods in domes and pre stressed domes – support structure for heavy equipment and conveyor and machinery in heavy industries – erection of articulated structures, braced domes and space decks.

UNIT - IV REHABILITATION TECHNIQUES**[8]**

Mud jacking grout through slab foundation - micro piling for strengthening floor and shallow profile - pipeline laying - protecting sheet piles, screw anchors - sub grade water proofing, underpinning, crack stabilization techniques.

UNIT - V DEMOLITIONTECHNIQUES**[7]**

Types of demolition-Advanced techniques and sequence in demolition and dismantling- Equipment for demolition-Precaution measures of demolition.

Total (L= 45, T = 0) = 45 Periods**Reference Books :**

- 1 Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, Fifth Edition 2008.
- 2 Peter.H. Emmons., Concrete Repair and Maintenance Illustrated, Galgotia Publications Pvt. Ltd., New Delhi, First Edition, January 2002.
- 3 Jerry Irvine., Advanced Construction Techniques, CA Rocketr, Claremont, First Edition, 1984.
- 4 Specifications of Handbook on Repair and Rehabilitation of RCC Buildings, Director general works, Central Public Works Department, Government of India, New Delhi, First Edition, 2011.

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

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

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SEMESTER - II

CN20212	PROJECT FORMULATION AND APPRAISAL	L	T	P	C
		3	0	0	3

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

CO1: Perform elements of Project formulation and appraisal.

Understand

CO2: Assess cost analysis report on the project.

Analyse

CO3: Evaluate Investment Appraisal the risk analysis and its assessment in practice.

Evaluate

CO4: Analyse Financial aspects of projects.

Apply

CO5: Perform Implementations of Private Sector Participation in construction projects.

Create

UNIT - I PROJECT FORMULATION [09]

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 [09]

Project Cash Flows-Type of cash flow – Time Value of Money – Cost of Capital-Problems

UNIT - III PROJECT APPRAISAL [09]

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 [09]

Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators – Ratios

UNIT - V PRIVATE SECTOR PARTICIPATION [09]

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

Total (L= 45, T = 0) = 45 Periods**Reference Books :**

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

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

SEMESTER - II

CN20213	CONSTRUCTION, PLANNING, SCHEDULING AND CONTROL	L	T	P	C
		3	0	0	3

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

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

UNIT I CONSTRUCTION PLANNING [09]

Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES [09]

Construction Schedules – Critical Path Method – Scheduling Calculations – Float – Presenting Project Schedules – Scheduling for Activity-on-Arrow and with Leads, Lags, and Windows – Scheduling with Resource Constraints and Precedence – Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations – Calculations for Monte Carlo Schedule Simulation – Crashing and Time/Cost Tradeoffs – Improving the Scheduling Process.

UNIT III COST CONTROL, MONITORING AND ACCOUNTING [09]

The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows – Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.

UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION [09]

Quality and Safety Concerns in Construction – Organizing for Quality and Safety – Work and Material Specifications – Total Quality Control – Quality Control by Statistical Methods – Statistical Quality Control with Sampling by Attributes – Statistical Quality Control with Sampling by Variables – Safety.

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION [09]

Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.

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

Reference Books :

- 1 Chitkara, K.K., Construction Project Management: Planning, Scheduling and Control, Mc Graw-Hill Publishing Company, New Delhi, Fourth Edition, 2019.
- 2 Calin M, Popescu. and Chotchai Charoenngam., Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, First Edition, 1995.
- 3 Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, First Edition, 2009.
- 4 <https://nptel.ac.in/courses/105/103/105103093/>.

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

SEMESTER - II

CN20214	SAFETY PRACTICES AND MANAGEMENT	L	T	P	C
		3	0	0	3

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

CO1:	Define all staff their accountabilities and responsibilities for the development and delivery of safety.	Remember
CO2:	Ensure that all staff is provided with adequate and appropriate safety information and training.	Understand
CO3:	Ensure that all staff is provided with adequate and appropriate safety information.	Understand
CO4:	Deliver the necessary training to build and maintain a meaningful operational safety leadership skill.	Apply
CO5:	Make sure the measurement of the organizational safety performance and safety targets are in place.	Understand

UNIT - I CONSTRUCTION ACCIDENTS [9]

Construction Accidents - Construction Safety Management: Importance – Causes of Accidents, Safety Measurers – Environmental Issues in Construction – Construction Industry related laws. Human Factors in Construction Safety - Legal and Financial aspects of accident in Construction - Occupational and Safety Hazard Assessment.

UNIT - II SAFETY PROGRAMMES AND CONTRACTUAL OBLIGATIONS [9]

Safety Programmes – Construction safety – Element of effective safety programmes – job –site assessment – Safety meetings – Safety Incentives. Contractual Obligations – Safety in Construction Contracts – Substance abuse – Safety Record keeping.

UNIT - III DESIGNING FOR SAFETY [9]

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

UNIT - IV OWNER'S AND DESIGNER'S OUTLOOK [9]

Accident Prevention – Cost of Accidents – Safety and Productivity – Safety Provision in the Factories act – Accident Reporting Investigation and Statistics – Total loss control and damage control – Safety sampling – Safety audit – Critical incidents technique – Safety equipment – Planning and Site preparation – safety system of storing construction materials – excavation – Blasting – Timbering – Scaffolding – Safe use of Ladder – Safety in Welding.

UNIT - V SAFETY IN HANDLING EQUIPMENT [9]

Safety in hand tools – Safety in grinding – Hoisting Apparatus and Conveyors – Safety in the Use of Mobile Cranes – manual Handling – Safety in Demolition work – Trusses , Girders and beams – First aid - Fire hazard and Prevention Methods – Interesting experience at the construction site against the fire accident.

Total = 45 Periods**Reference Books :**

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

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

SEMESTER - II

CN20221	ADVANCED COMPUTING TECHNIQUES LABORATORY	L	T	P	C
		0	0	3	2

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Apply computational techniques in optimization and sequencing problems	Apply
CO2: Plan using management tools	Apply
CO3: Allocate resources for construction projects	Apply
CO4: Quantify the volume of activities involved in a project	Apply
CO5: Assume modern technology for information.	Analyse

List of Experiments:

1. Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project.
2. Design of a simple equipment information system for a construction project.
3. Scheduling of a construction project using software.
4. Scheduling of a construction project using tools like MS project scheduling systems.
5. Resource allocation for construction project and levelling of the resources.
6. Monitoring of the construction project, tracking and taking reports using tools like MS project scheduling systems.
7. Inventory management system for the given construction project.
8. Simulation models for project risk analysis

LIST OF SOFTWARES

1. MS OFFICE
2. QE PRO
3. MS PROJECT
4. PRIMAVERA SOFTWARE

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

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - II

CN20222

TECHNICAL PRESENTATION - II

L	T	P	C
0	2	0	1

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Identify the area of interest of the student.

Apply

CO2: Identify the thrust areas by referring journals, conference proceedings etc.

Apply

CO3: Familiarize with literature collection.

Understand

CO4: Demonstrate his/her own ideas in the current topic.

Understand

CO5: Perceive about report writing and presentation.

Evaluate

- The students have to refer the journals and conference proceedings and collect the literature.
- The students can select a course oriented topic.
- The students have to collect at least 30 research papers published in the last decades.
- Using OHP / Power Point, the student has to make presentation for 20 minutes followed by 10 minutes discussion.
- The student has to make five presentations in the semester.
- The student has to write a technical report for about 30 - 50 pages (Title page, One page Abstract, Review of Research paper under various sub - headings, concluding remarks and list of references).
- The technical report has to be submitted to the course coordinator one week before the final presentation.

Total = 30 Periods

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - III

CN20321

PROJECT WORK - PHASE I

L	T	P	C
0	0	12	6

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Identify current industry / research needs.

Apply

CO2: Demonstrate experimental procedures.

Understand

CO3: Collect the data from the literature surveys and able to frame the methodology.

Create

CO4: Summarize the works carried out and can be compared with the Codal provisions.

Understand

CO5: Apply the solutions for the results identified.

Apply

1. Every student shall have a supervisor who is the member of the faculty of the institution. Selection of faculty supervisor has to be completed within the first two weeks from the day of beginning of third semester.
2. The students should make discussion with his supervisor for selecting topic.
3. In consultation with supervisor, student has to collect research papers and journals.
4. Preferably it can be an experimental work or it can be a case study.
5. A detailed study of the collected literatures to be carried out.
6. The methodology should be framed and works carried out based on the framed methodology.
7. Phase - I project report should be submitted at the end of the semester as per guidelines.
8. This project report should be evaluated jointly by external and internal examiners.

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - III

CN20322

PRACTICAL TRAINING

L	T	P	C
0	0	20	1

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

- CO1: Assess about the practical training related to Construction Engineering and Management.
CO2: Apply the industrial exposure through various industrial experiments.
CO3: Augment the collective skills between theoretical knowledge and real time work.
CO4: Identify the impact of health, safety and environmental solutions on productivity, quality and Society at large.
CO5: Solve the solutions for the problems identified.

Evaluate
Apply
Apply
Apply
Create

1. The faculty allotted for practical training will act as supervisor.
2. The student shall finally produce a comprehensive report covering back field information, field survey, methodology implemented, results and discussions with conclusion.
3. This practical training report shall be submitted for evaluation.
4. The knowledge gained in practical training shall be assessed in presentation.
5. The practical training report should be evaluated by internal examiner

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - IV

CN20421	PROJECT WORK – PHASE II	L	T	P	C
		0	0	30	12

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Identify current industry / research needs.	Apply
CO2: Demonstrate experimental procedures.	Understand
CO3: Collect the data from the literature surveys and able to frame the methodology.	Create
CO4: Summarize the works carried out and can be compared with the Codal provisions.	Understand
CO5: Apply the solutions for the results identified.	Apply

1. The supervisor allotted for project Phase I will continue to supervise project Phase II.
2. As per methodology suggested in Phase I, the project can be implemented.
3. Outcome of implementation can be studied and each student shall finally produce a report covering background information , literature survey , problem statement, research discussion with conclusion and industry certificate (If applicable).
4. Phase II project report should be submitted at the end of the semester as per guidelines.
5. This project report should be evaluated jointly by external and internal examiners.

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - I

CN20161	MANAGEMENT INFORMATION SYSTEM	L	T	P	C
	(Professional Elective)	3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Deliver the knowledge on information systems in frame work model and Business model.	Understand
CO2: Identify and apply the suitable Computer Based methods.	Analyze
CO3: Construct the information systems models to project management by DSS, EIS, and ES.	Analyze
CO4: Appraise the cost, value and risk of information system.	Create
CO5: Identify different types of software for verification and validation.	Apply

UNIT - I INFORMATION SYSTEMS [09]

Information Systems -Establishing the Framework - Business Models – Information System Architecture - Evolution of formation Systems.

UNIT - II MODERN INFORMATION SYSTEM [09]

Modern Information System - Systems Development-life Cycle - Structured Methodologies - Designing Computer Based methods, Procedures Control - Designing Structured Programs.

UNIT - III INTEGRATED CONSTRUCTION MANAGEMENT [09]

Integrated Construction Management- Information System- Project Management-Information System- Functional Areas finance, Marketing Production, Personnel – evels, Decision Support System(DSS), Executive information system (EIS), ES- Comparison Concepts and Knowledge representation –Managing International Information System

UNIT - IV CODING TECHNIQUES [09]

Control -Testing Security- Coding Techniques - Defection of Error – Validating – Cost Benefit Analysis -Assessing the value and risk of Information System.

UNIT - V SOFTWARE ENGINEERING [09]

Software engineering qualities - Design-Production- Service, Software specification-Software Metrics, Software quality assurance – Systems Methodology – Objectives -Time and Logic, Knowledge and Human Dimension -Software life cycle models-Verification and Validation.

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

Reference Books :

- 1 Kenneth Laudon. and Jane Laudon., Essentials of Management Information Systems: Organization and Technology, Pearson Higher Education & Professional Group, New York, Fourth Edition, 2020.
- 2 Gordon Davis. and Margrethe Olson., Management Information System: Conceptual Foundations Structure and Development, McGraw Hill, New Delhi, Second Edition, 2017.
- 3 Joyce J, Elam., Case series for Management Information Systems, Pearson custom publishing, New York, First Edition, 2006.
- 4 Ralph Sprague, H. and Huge J, Watson., Decision Support for Managers, Prentice Hall India, New Delhi, First Edition, 2006.

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

SEMESTER - I

CN20162	DISASTER MANAGEMENT (Professional Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Identify the basic objectives of disaster management.	Remember
CO2: Relate the phases of disaster management cycle in emergency durations.	Understand
CO3: Inspect the possibilities from response and recovery of disaster management cycle.	Analyse
CO4: Construct the various bodies of disaster community activities and plans.	Create
CO5: Elaborate recent strategies towards disasters preparedness and planning.	Create

UNIT - I OBJECTIVES [09]

Objectives-Overview of Disaster Management – Distinguishing between an emergency and a Disaster situation. Disaster Management Cycle – Phase I: Mitigation, and strategies; hazard Identification and vulnerability analysis. Disaster Mitigation and Infrastructure, impact of disasters on development Programmes, vulnerabilities caused by development, developing a draft country-level disaster and development policy

UNIT - II DISASTER MANAGEMENT CYCLE [09]

Phases-Disaster Management Cycle – Phase II: Preparedness, Disaster Risk Reduction(DRR), Emergency Operation Plan (EOP), Mainstreaming Child Protection and Gender in Emergency Planning, Assessment,

UNIT - III DISASTER MANAGEMENT CYCLE [09]

Disaster Management Cycle – Phases III and IV: Response and recovery, Response aims, Response Activities, Modern and traditional responses to disasters, Disaster Recovery, and Plan , Disasters as opportunities for development initiatives

UNIT - IV DISASTER COMMUNITY [09]

Disaster Community-Community-based Initiatives in Disaster management, need for Community-Based Approach, categories of involved organizations: Government, Non government organizations (NGOs), Regional And International Organizations, Panchayaths, Community Workers, National And Local Disaster Managers, Policy Makers, Grass-Roots Workers, Methods Of Dissemination Of Information, Community-Based Action Plan, Advantages/Disadvantages Of The Community- Based Approach.

UNIT - V DISASTER PLANNING [09]

Disaster Planning-Disaster Response Personnel and duties, Community Mitigation Goals, Pre-Disaster Mitigation Plan, Personnel Training, Volunteer Assistance, School-based Programmes, Hazardous Materials, Ways of storing and safely handling hazardous materials, Coping with Exposure to Hazardous Materials

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

Reference Books :

- 1 Ayaz., Disaster Management: Through the New Millennium, Anmol Publications, Bangalore, First Edition, 2009.
- 2 Dave, P. K., Emergency Medical Services and Disaster Management: A Holistic Approach, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, First Edition, 2009.
- 3 Narayan, B., Disaster Management, A.P.H. Publishing Corporation, New Delhi, First Edition, 2009.
- 4 Kumar, N., Disaster Management, Alfa Publications, New Delhi, First Edition, 2009.

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

SEMESTER - I

CN20163	RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS (Professional Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Explain the concepts related to research	Understand
CO2: Analyse, interpret, and apply research and research-related data.	Analyze
CO3: Recognize, analyse, and solve society problems and environment problems	Analyze
CO4: Compile research data	Create
CO5: Explain the need of intellectual property rights	Understand

UNIT - I RESEARCH CONCEPTS [09]

Concepts, meaning, objectives, motivation, types of research, approaches, research (Descriptive research, Conceptual, Theoretical, Applied & Experimental). Formulation of Research Task – Literature Review, Importance & Methods, Sources, quantification of Cause Effect Relations, Discussions, Field Study, Critical Analysis of Generated Facts, Hypothetical proposals for future development and testing, selection of Research task

UNIT - II MATHEMATICAL MODELING AND SIMULATION [09]

Concepts of modelling, Classification of Mathematical Models, Modelling with Ordinary differential Equations, Difference Equations, Partial Differential equations, Graphs, Simulation, Process of formulation of Model based on Simulation

UNIT - III EXPERIMENTAL MODELING [09]

Definition of Experimental Design, Examples and Single factor Experiments, Guidelines for designing experiments. Process Optimization and Designed experiments, Methods for study of response surface, determining optimum combination of factors, Taguchi approach to parameter design

UNIT - IV ANALYSIS OF RESULTS AND REPORT WRITING [09]

Parametric and Non-parametric, descriptive and Inferential data, types of data, collection of data (normal distribution, calculation of correlation coefficient), processing, analysis, error analysis, different methods, analysis of variance, significance of variance, analysis of covariance, multiple regression, testing linearity and non-linearity of model.

Report Writing: Types of reports, layout of research report, interpretation of results, style manual, layout and format, style of writing, typing, references, tables, figures, conclusion, appendices.

UNIT - V INTELLECTUAL PROPERTY RIGHTS [09]

Administration of patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge case Studies, IPR and IITs.

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

Reference Books :

- 1 Kothari, C.R. and Gaurav Garg., Research Methodology Methods and Techniques, New Age International (P) Limited Publishers, New Delhi, First Edition, 2019.
- 2 Panneerselvam, R., Research Methodology, PHI Learning Private Limited, New Delhi, Second Edition, 2014.
- 3 Douglas Montgomery., Design and Analysis of Experiments by Douglas Montgomery, SAS Institute, California, 2013.
- 4 Rao, S.S., Optimization Theory and Application, Wiley Eastern Ltd, New Delhi, First Edition, 1996.

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

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

R 2020

SEMESTER - I

CN20164	BUSINESS ECONOMICS AND FINANCE MANAGEMENT	L	T	P	C
	(Professional Elective)	3	0	0	3

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

CO1: Inference the elements of Economics related to construction.	Analyse
CO2: Plan and bring about an exposure to construction economics.	Apply
CO3: Perceive about the financing of construction project.	Evaluate
CO4: Outline about the accounting methods and their usefulness in controlling construction projects.	Understand
CO5: Assess a complete understanding on about finance lending to contractors.	Evaluate

UNIT - I ECONOMICS [10]

Role of Civil Engineering in Industrial Development – Advances in Civil Engineering - Engineering Economics – Support Matters of Economy related to Engineering – Market demand and supply – Choice of Technology – Quality Audit in economic law of returns governing production.

UNIT - II CONSTRUCTION ECONOMICS [10]

Construction development in Housing, transport energy and other infrastructures – Economics of ecology, environment, energy resources – Local material selection – Form and functional designs – Construction workers – Urban Problems – Poverty – Migration– Unemployment – Pollution.

UNIT - III FINANCING [13]

The need for financial management - Types of financing – Financing instruments– short term borrowing – Long term borrowing – Leasing – Equity financing – Internal generation of funds – External commercial borrowings – Assistance from government budgeting support and international finance corporations – Analysis of financial statements – Balance Sheet - Profit and Loss account – Cash flow and Fund flow analysis – Ratio analysis – Investment and financing decision – Financial Control - centralized management.

UNIT - IV ACCOUNTING METHOD [06]

General Overview – Cash basis of accounting – Accrual basis of accounting – Percentage completion method – Completed contract method – Accounting for tax reporting purposes and financial reporting purposes – Accounting Standards.

UNIT - V LENDING TO CONTRACTORS [06]

Loans to Contractors – Interim construction financing – Security and risk aspects.

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

Reference Books :

- 1 Ercan Ozen. Hakan Boz. and Simon Grima., Contemporary Issues in Business, Economics and Finance, Emerald Publishing Limited, United Kingdom, First Edition, 2020.
- 2 Aryasri, A.R., Business Economics and Financial Analysis, McGraw-Hill Education, Chennai, First Edition, 2020.
- 3 Min Zhu., Business, Economics, Financial Sciences, and Management, Springer, Germany, First Edition, 2012.
- 4 <http://www.nptel.ac.in/syllabus/105102014/>.

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

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

R 2020

SEMESTER - I

CN20165	PAVEMENT ENGINEERING (Professional Elective)	L	T	P	C
		3	0	0	3

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

- CO1: Characterize strength and durability of pavement materials
 CO2: Apply the concepts of bituminous courses
 CO3: Explain and account for climatic factors in pavement design and analysis
 CO4: Relate the mechanisms of pavement deterioration and identify distress types
 CO5: Construct pavement preservation techniques

Cognitive Level

- Apply
 Understand
 Understand
 Remember
 Apply

UNIT - I MATERIALS FOR FLEXIBLE AND RIGID PAVEMENTS [9]

Classification, testing, applications of road making materials – aggregates-Road binders – Bitumen – Cement-Selection of Cement.

UNIT - II PROPERTIES OF BITUMINOUS MIXTURES [10]

Resistance of bituminous mixtures to permanent deformation – Flexibility and brittleness - Common mechanical tests – Permeability characteristics – Weathering of bituminous road surfacing – Adhesion of bituminous binders to road aggregates – Effect of aggregate size in bituminous courses – Temperature susceptibility of bituminous courses – Design of bituminous mixes.

UNIT - III PROPERTIES OF PAVEMENT AND CONSTRUCTION PRACTICE [11]

Properties of fresh and hardened concrete – laboratory tests – Design of concrete mixes for Pavement Control- Construction of various layers in rigid and flexible pavements – Quality assurance during construction – sampling and analysis.

UNIT - IV MACHINERIES FOR ROAD CONSTRUCTION [8]

Road making machineries – Road formation, bituminous constructions – Road surface evaluation

UNIT - V ADVANCEMENTS IN PAVEMENT ENGINEERING [7]

Methods to improve bitumen quality – Rheological and chemical additives – Polymer modified bitumen – Super pave concepts – Recycling of bituminous courses – Smart materials for cement concrete pavement – Use of admixtures, waste materials and fibres- Pervious Concrete.

Total = 45 Periods**Reference Books :**

- 1 Rashad Islam, M. and Rafiqul Tarefder., Pavement Design: Materials, Analysis, and Highways, McGraw-Hill Education, New York, First Edition, 2020.
- 2 Rajib Mallick, B. and Tahar El-Korchi., Pavement Engineering Principles and Practice, CRC Press, Florida, Third Edition, 2017.
- 3 Khanna, S.K. and Justo C.E.G. and Veeraragavan, A., Highway Engineering, New Chand and Brothers, New Delhi, Tenth Edition, 2014.
- 4 Mix Design Methods for Asphalt Concrete and other Hot mix types MS 2, The Asphalt Institute, Kentucky, Sixth Edition 1997.

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

SEMESTER - I

CN20166	QUANTITATIVE TECHNIQUES IN MANAGEMENT (Professional Elective)	L	T	P	C
		3	0	0	3

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

Cognitive Level

CO1:	Interpret the linear programming and graphical methods		
CO2:	Construct on EOQ, simulation models & Quality Control		Remember
CO3:	Relate working capital cost and capital budgeting		Apply
CO4:	Plan under critical situation by decision theory		Understand
CO5:	Design on cost concepts and pricing techniques		Create

UNIT - I OPERATIONS RESEARCH [9]

Introduction to Operations Research - Linear Programming – Graphical and Simplex Methods, Duality and Post – Optimality Analysis – Transportation and Assignment Problems.

UNIT - II PRODUCTION MANAGEMENT [9]

Inventory Control - Economic order quantity (EOQ) - Quantity Discounts - Safety Stock – Replacement Theory – Program Evaluation Review Technique (PERT) and Critical Path Method (CPM) – Simulation Models – Quality Control.

UNIT - III FINANCIAL MANAGEMENT [9]

Working Capital Management – Compound Interest and Present Value methods – Discounted Cash Flow Techniques – Capital Budgeting.

UNIT - IV DECISION THEORY [9]

Decision Theory – Decision Rules – Decision making under conditions of certainty, risk and uncertainty – Decision trees – Utility Theory.

UNIT - V MANAGERIAL ECONOMICS [9]

Cost Concepts – Break-even analysis – Pricing Techniques – Game theory Applications.

Total = 45 Periods

Reference Books :

- 1 Miguel Angel Canela. Ines Alegre. and Alberto Ibarra., Quantitative Methods for Management A Practical Approach, Springer International Publishing, New York, First Edition, 2019.
- 2 Schroeder, R.G., Operations Management, McGraw Hill, New York, Seventh Edition, 2017.
- 3 Hamdy Taha., Operations Research: An Introduction, Prentice Hall, New Jersey, Tenth Edition, 2016.
- 4 Louise Swift. and Sally Piff., Quantitative Methods: for Business, Management and Finance, Bloomsbury Publishing, London, Third Edition, 2014.

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER – II

CN20261	GIS IN CONSTRUCTION ENGINEERING AND MANAGEMENT (Professional Elective)	L 3	T 0	P 0	C 3
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Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Recall the basic concepts and technologies used in the field of GIS.	Remember
CO2: Construct the processes of developing and implementing spatial and non-spatial data.	Apply
CO3: Outline the role of the ethical, social, and security issues of data structure.	Understand
CO4: Translate the role of data quality for organization management.	Remember
CO5: Infer the natural resource management systems in Construction management.	Analyse

UNIT - I INTRODUCTION TO GIS [09]

GIS – Definition – Components of GIS – Maps - Definition – Types of Maps – Characteristics of Maps – Map Projections – Hardware, Software and Organizational Context – GIS software.

UNIT - II TYPES OF DATA [09]

Data Types – Spatial and Non-Spatial – Spatial Data – Point, Lines and areas – Non-spatial data – Nominal, Ordinal, Interval and Ratio – Digitizer – Scanner – Editing and Cleaning – Geo reference data.

UNIT - III DATA STRUCTURE [09]

Raster and Vector Data Structure – Raster data storage – Run length, Chain and Block Coding – Vector Data Storage – Topology – Topological Models – Arc Node Structure – Surface Data – DEM – Grid DEM and TIN structure – Application of DEM.

UNIT - IV DATA QUALITY [09]

Reclassification – Measurement – Buffering – Overlaying – SQL for Queries – Neighbourhood and zonal operations – Data Quality – Components of data quality – Sources of errors in GIS – Meta data.

UNIT - V DIFFERENT TYPES OF OUTPUT [09]

Output – Maps, Graphs, Charts, Plots, Reports – Printers – Plotters – Fields of application – Natural Resource Management, construction management – Parcel based, AM/FM application examples – Case study.

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

Reference Books :

- 1 Anji Reddy., Text Book of Remote Sensing and Geographical Information Systems, BS Publications, Telangana, First Edition, 2014.
- 2 Burrough, P.A., Principles of GIS for Land Resources Assessment, Oxford University Press, London, First Edition, 2008.
- 3 Robert Laurini. and Derek Thompson., Fundamentals of Spatial Information Systems, Academic Press, Cambridge, First Edition, 2006.
- 4 Panda, B.C., Remote Sensing: Principles and Applications, Viva Books, Bangalore, First Edition, 2008.

Course Faculty

Module Coordinator

Chairman BoS/CIVIL

SEMESTER - II

CN20262	MODERN STRUCTURAL MATERIALS AND SYSTEM DESIGN (Professional Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Identify the different modern materials and their behaviour	Apply
CO2: Simplify about the various types of load acting on structures	Analyse
CO3: Explain the various mechanism on load transfer and behaviour	Understand
CO4: Illustrate about the various construction projects and design stages	Understand
CO5: Interpret about the maintenance and rehabilitation of structure	Understand

UNIT - I MODERN STRUCTURAL MATERIAL [9]

Modern structural material: Essential requirements – properties – classification. Masonry: Concrete masonry units – advantages and disadvantages – sub divisions – requirements – types of units - construction system – types of structural wall – structure – characteristics – construction type – behaviour - failure in flexure and shear. Concrete: Characteristics – behaviour – compression – tension. Steel: Types – grades – behaviour – tension. Reinforced concrete: Types of section – behaviour – cyclic loading. Fiber reinforced concrete: Properties – requirements – factors – benefits – applications. Composite materials: SCS construction – failure modes – concept – behaviour – applications.

UNIT - II LOADS [9]

Loads: Static monotonic and cyclic dynamic loads - Dead loads: Materials – components. Imposed loads: General provisions – categories – Reduction factors – example. Wind loads: Basics – pressure – static and dynamic approach – along wind – Gust factor method. Earthquake load: General provisions – assumptions – base shear – distribution. Blast loads: Drag & diffraction type – scaling law – general recommendation – special loads. (Indian standard codal provisions)

UNIT - III STRUCTURAL SYSTEMS [9]

Structural systems: Functions – understanding – load transfer mechanism – floor system – types – aspects. Vertical load transfer system: Wall bearings – column / post. Horizontal load transfer system: Cost of system – basics of system – functions – classifications – rigid frames – advantages – behaviour due to external shear and moments – analysis methods – braced frames – types – behaviour – methods of analysis

UNIT - IV DESIGN CONCEPTS [9]

Design Concepts: Objectives – basic requirements – phases of construction projects - process of design - conceptual design – steps involved. High rise structures: Need – benefits – drawbacks – common requirements for structures – other requirements – design parameters – stages of design – elements of structural system – economy in design

UNIT - V REPAIR AND REHABILITATION [9]

Repair and Rehabilitation: Introduction – defects – repair cost - distress in structures – types – deterioration of structures – causes for deterioration. Techniques of repair – cracks – spalling – disintegration – materials for repair - strengthening techniques of structural distress – damage evaluation – assessment procedure – flow chart. Quality monitoring: Maintenance -importance – routine maintenance.

Total (L= 45, T = 0) = 45 Periods**Reference Books :**

- 1 Elias Cueto. and David Gonzalez., An Introduction to Structural Mechanics for Architects, Springer International Publishing, New York, First Edition, 2018.
- 2 Bryan Christiansen. and Gulsah Koç., Reusable and Sustainable Building Materials in Modern Architecture, IGI Global, Pennsylvania, First Edition, 2018.
- 3 Andreas Ochsner. and Holm Altenbach., Mechanical and Materials Engineering of Modern Structure and Component Design, Springer International Publishing, New York, Second Edition, 2016.
- 4 Enjel Heinrich., Structures Systems, Iliffe Publishing, London, First Edition, 2007.

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

SEMESTER - II

CN20263	PERSONNEL MANAGEMENT IN CONSTRUCTION (Professional Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to

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

UNIT - I MAN POWER PLANNING [9]

Manpower Planning process , Organizing, Staffing, directing, and controlling – Estimation, manpower requirement – Factors influencing supply and demand of human resources – Role of HR manager – Personnel Principles.

UNIT - II ORGANISATION [9]

Organisation – Span of Control – Organisation Charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection - Placement, Training and Development

UNIT - III HUMAN BEHAVIOUR [9]

Introduction to the field of people management - basic individual psychology; motivation - Job design and performance management - Managing groups at work - self-managing work teams - intergroup behaviour and conflict in organizations – Leadership - Behavioural aspects of decision-making; and communication for people management

UNIT - IV WELFARE MEASURES [9]

Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.

UNIT - V MANAGEMENT AND DEVELOPMENT METHODS [9]

Compensation - Wages and Salary, Employee Benefits, employee appraisal and assessment - Employee services - Safety and Health – Discipline and discharge - Special Human resource problems, Performance appraisal. - Employee hand book and personnel manual - Job descriptions and organization structure and human relations – Productivity of Human resources

Total = 45 Periods**Reference Books :**

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

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

SEMESTER - II

CN20264	CONSTRUCTION PROJECT MANAGEMENT (Professional Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to		Cognitive Level
CO1:	Develop knowledge of Construction Professional Services, Finance facilities, Legal and regulatory requirements, Role of contractors and Project Managers.	Apply
CO2:	Identify the basic cost flows, Planning and project budget.	Understand
CO3:	Demonstrate about the Feasible terms relating to construction.	Understand
CO4:	Explain the knowledge on utilization of labour, materials and equipments.	Understand
CO5:	Describe about the cost associated terms in construction project.	Apply

UNIT - I THE OWNERS' PERSPECTIVE [9]

Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers

UNIT - II ORGANIZING FOR PROJECT MANAGEMENT [9]

Project Management – modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants - Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-BUILDER Operation - Turnkey Operation - Leadership and Motivation for the Project Team

UNIT - III DESIGN AND CONSTRUCTION PROCESS [9]

Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment

UNIT - IV LABOUR, MATERIAL AND EQUIPMENT UTILIZATION [9]

Historical Perspective - Labor Productivity - Factors Affecting Job-Site Productivity - Labor Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks

UNIT - V COST ESTIMATION [9]

Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs

Total = 45 Periods**Reference Books :**

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

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

SEMESTER - II

CN20265	ENERGY CONSERVATION TECHNIQUES IN BUILDING CONSTRUCTION AND MAINTENANCE (Professional Elective)	L	T	P	C
		3	0	0	3

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

CO1: Categorize about the fundamentals of energy and energy production systems pertaining to Residential, Commercial, Institutional and Public Buildings.	Analyse
CO2: Relate the potential of building energy efficiency to impact the nation's energy future, especially as it applies to climate change.	Remembering
CO3: Develop and integrate various options and assess the concepts of energy efficient design	Create
CO4: Construct the strategy and policy recommendations on energy auditing..	Create
CO5: Demonstrate the energy management of electrical equipment and appliances in buildings.	Understand

UNIT - I Fundamentals of Energy [9]

Fundamentals of Energy – Energy production systems – Heating, Ventilating and Air-conditioning – Solar Energy and conservation – Geothermal energy - Energy economics Analysis – Energy conservation – Domestic energy consumption – savings – challenges – Primary energy use in buildings – Residential – commercial – Institutional and public buildings

UNIT - II Energy and Resource Conservation [9]

Energy and resource conservation – Evaluation tools for building energy – Embodied and operating energy – Peak demand – Visual and acoustical quality – Land, water and materials – airborne emissions and Waste Management

UNIT - III Design Consideration [9]

Natural building design consideration – Energy efficient design strategies – Contextual factors –Longevity and process assessment – Renewable energy sources and design –Acoustic Design- Rain Water harvesting -Design of green buildings – Indian Green Building Council and LEED standards - Advanced building technologies – Smart buildings – Economics and cost analysis.

UNIT - IV Energy in Building Design [9]

Energy in building design – Energy efficient and environmental friendly building – thermal phenomena – climate, sun and solar radiation –Psychometrics – Passive and Active HVAC systems – Preliminary investigations – Goals and policies – Energy audit – Types of Energy Audit – Analysis of results – Energy flow diagram – Energy consumption/Unit production – Identification of wastage –Priority of conservative measures.

UNIT - V Energy Management [9]

Energy management of electrical equipment – Improvement of power factor – Management of maximum demand – Energy savings in pumps – Fans – Compressed air systems – energy savings in lighting systems – Energy management in Façade systems - Air conditioning systems – Applications – Facility operation and maintenance – Facility modifications – Energy recovery dehumidifier – Water heat recovery – Steam plants and distribution systems – Improvement of boiler efficiency – Frequency of blow down – steam leakage – Steam flash and condense return

Total = 45 Periods**Reference Books :**

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

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

SEMESTER - II

CN20266	TALL STRUCTURES (Professional Elective)	L	T	P	C
		3	0	0	3

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

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

UNIT I LOADING AND DESIGN PRINCIPLES **[09]**

Loading- sequential loading, Gravity loading, Wind loading, Earthquake loading, - Equivalent lateral force, modal analysis - combination of loading, – Static and Dynamic approach - Analytical and wind tunnel experimental methods - Design philosophy - working stress method, limit state method and plastic design.

UNIT II BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS **[09]**

Factors affecting growth, height and structural form. High rise behaviour, Rigid frames, braced frames, In filled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, outrigger - braced and hybrid mega systems.

UNIT III ANALYSIS AND DESIGN **[09]**

Modelling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist - Computerized three dimensional analysis – Assumptions in 3D analysis – Simplified 2D analysis.

UNIT IV STRUCTURAL ELEMENTS **[09]**

Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow, Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance.

UNIT V STABILITY OF TALL BUILDINGS **[09]**

Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis, Translational, Tensional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.

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

Reference Books :

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

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

SEMESTER - III

CN20361	PREFABRICATED STRUCTURES	L	T	P	C
	(Professional Elective)	3	0	0	3

Course Outcomes: On Completion of this course, the student will be able to	Cognitive Level
CO1: Interpret the design principle of prefabricated members	Evaluate
CO2: Develop the different types of elements in prefabrications	Create
CO3: Design the concept of prefabricated members	Create
CO4: Identify the load transfer in different wall panels and joints	Apply
CO5: Construct the components of industrial buildings and roofs members.	Apply

UNIT - I DESIGN PRINCIPLES [9]

General Civil Engineering Requirements, Specific Requirements for Planning and Layout of Prefabricates Plant. IS Code Specification, Modular Co-ordination, Standardization, Disuniting of Prefabricates, Production, Transportation, Erection, Stages of Loading and Codal Provisions, Safety Factors, Material Properties, Deflection Control, Lateral Load Resistance.

UNIT - II PREFABRICATED ELEMENTS [9]

Prefabricated Structures - Long Wall and Cross-Wall Large Panel Buildings, One Way and Two Way Prefabricated Slabs, Framed Buildings with Partial and Curtain Walls - Connections – Beam to Column and Column to Column.

UNIT - III FLOORS, STAIRS AND ROOFS [9]

Types of Floor Slabs, Analysis and Design Example of Cored and Panel Types and Two-Way Systems, Staircase Slab Design, Types of Roof Slabs and Insulation Requirements, Description of Joints, their Behaviour and Reinforcement Requirements, Deflection Control for Short Term and Long Term Loads, Ultimate Strength Calculations in Shear and Flexure.

UNIT - IV WALLS & JOINTS [9]

Types of Wall Panels, Blocks and Large Panels, Curtain, Partition and Load Bearing Walls, Load Transfer From Floor to Wall Panels, Vertical Loads, Eccentricity and Stability of Wall Panels, Design Curves, Types of Wall Joints, Their Behavior and Design, Leak Prevention, Joint Sealants, Location and Types of Shear Walls Sandwich Wall Panels, Approximate Design of Shear Walls.

UNIT - V INDUSTRIAL BUILDINGS AND SHELL ROOFS [9]

Components of Single- Storey Industrial Sheds with Crane Gantry Systems, R.C. Roof Trusses, Roof Panels, Corbels and Columns, Wind Bracing Design. Cylindrical, Folded Plate, Hyper-Prefabricated Shells, Erection and Jointing, Joint Design, ACI Hand Book Based Design.

Total = 45 Periods**Reference Books :**

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

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

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

R 2020

SEMESTER - III

CN20362	COMPUTER APPLICATION IN CONSTRUCTION ENGINEERING AND PLANNING	L	T	P	C
	(Professional Elective)	3	0	0	3

Course Outcomes: On Completion of this course, the student will be able to.	Cognitive Level
CO1: Obtain awareness about the computer applications in construction.	Remember
CO2: Apply the different optimization techniques.	Apply
CO3: Develop inventory models through software applications.	Create
CO4: Solve scheduling problems by computer applications.	Apply
CO5: Educate about simulation and ERP systems.	Understand

UNIT - I INTRODUCTION [9]

Overview of IT Applications in Construction – Construction Process – Computerization in Construction – Computer Aided Cost Estimation – Application with Database Software. BIM for Construction Engineering.

UNIT - II OPTIMIZATION TECHNIQUES [9]

Linear, Dynamic and Integer Programming – Branch and Bound Techniques – Application to Production Scheduling, Equipment Material Transportation and Work Assignment Problems – Software applications.

UNIT - III INVENTORY MODELS [9]

Deterministic and Probabilistic Inventory Models – Software applications.

UNIT - IV SCHEDULING APPLICATION [9]

PERT and CPM – Advanced planning and scheduling concepts – Computer applications – Case study

UNIT - V OTHER PROBLEMS [9]

Sequencing problems – Simulation – Enterprises – Introduction to ERP systems.

Total = 45 Periods

Reference Books :

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

Course Faculty

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Chairman BoS/CIVIL

SEMESTER – III

CN20363	QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION (Professional Elective)	L 3	T 0	P 0	C 3
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Course Outcomes: On Completion of this course, the student will be able to.

<p>CO1: Describe the principles of Quality management</p> <p>CO2: Implement the basic in quality management system.</p> <p>CO3: Suggest the feasibility in planning in quality procedures.</p> <p>CO4: Recognize the quality assuring and control systems.</p> <p>CO5: Appreciate the quality techniques to be followed in improving the construction field.</p>	<p>Cognitive Level understand</p> <p>Apply</p> <p>Apply</p> <p>understand</p> <p>understand</p>
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UNIT - I QUALITY MANAGEMENT [9]

Introduction – Definitions and Objectives – Factor Influencing Construction Quality - Responsibilities and Authority - Quality Plan - Quality Management Guidelines – Quality Circles

UNIT - II QUALITY SYSTEMS [9]

Introduction - Quality System Standard – ISO 9000 Family of Standards – Requirements – Preparing Quality System Documents – Quality Related Training – Implementing a Quality System – Third Party Certification

UNIT - III QUALITY PLANNING [9]

Quality Policy, Objectives and Methods in Construction Industry - Consumers Satisfaction, Ergonomics - Time of Completion - Statistical Tolerance – Taguchi’s Concept of Quality – Codes and Standards – Documents – Contract and Construction Programming – Inspection Procedures - Processes and Products – Total QA / QC Programme and Cost Implication

UNIT - IV QUALITY ASSURANCE AND CONTROL [9]

Objectives - Regularity Agent, Owner, Design, Contract and Construction Oriented Objectives, Methods - Techniques and Needs of QA/QC - Different Aspects of Quality - Appraisals, Factors Influencing Construction Quality - Critical, Major Failure Aspects and Failure Mode Analysis, -Stability Methods and Tools, Optimum Design - Reliability Testing, Reliability Coefficient and Reliability Prediction

UNIT - V QUALITY IMPROVEMENT TECHNIQUES [9]

Selection of New Materials - Influence of Drawings, Detailing, Specification, Standardization - Bid Preparation - Construction Activity, Environmental Safety, Social and Environmental Factors - Natural Causes and Speed of Construction - Life Cycle Costing - Value Engineering and Value Analysis

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

Reference Books :

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

Course Faculty

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SEMESTER - III

CN20364	RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION (Professional Elective)	L	T	P	C
		3	0	0	3

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

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

UNIT - I RESOURCE PLANNING [9]

Resource Planning, Procurement, Identification, Personnel, Planning for Material, Labour, Time Schedule and Cost Control, Types of Resources, Manpower, Equipment, Material, Money, Time

UNIT - II LABOUR MANAGEMENT [9]

Systems Approach, Characteristics of Resources, Utilization, Measurement of Actual resources required, Tools for Measurement of Resources, Labour, Classes of Labour, Cost of Labour, Labour Schedule, and Optimum Use of Labour.

UNIT - III MATERIALS AND EQUIPMENT [9]

Material: Time of Purchase, Quantity of Material, Sources, Transportation, Delivery and Distribution Equipment: Planning and Selection by Optimistic Choice with Respect to Cost, Time, Source and Handling.

UNIT - IV TIME MANAGEMENT [9]

Personnel Time, Management and Planning, Managing Time on the Project, Forecasting the Future, Critical Path Measuring the Changes and their Effects-Cash Flow and Cost Control.

UNIT - V RESOURCE ALLOCATION AND LEVELLING [9]

Time - Cost Trade off, Computer Application -Resource Leveling, Resource List, Resource Allocation, Resource Loading, Cumulative Cost - Value Management.

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

Reference Books :

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

Course Faculty

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SEMESTER - III

CN20365	SHORING, SCAFFOLDING AND FORMWORK (Professional Elective)	L	T	P	C
		3	0	0	3

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

UNIT - I PLANNING, SITE EQUIPMENT & PLANT FOR FORM WORK [09]

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 [09]

Lumber - Types - Finish - Sheathing boards working stresses - Repetitive member stress - Plywood - Types and grades - Jointing Boarding - Textured surfaces and strength - Reconstituted wood - Steel - Aluminium - Hardware and fasteners - Nails in Plywood - Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Vertical loads for design of slab forms - Uplift on shores - Laterals loads on slabs and walls.

UNIT - III DESIGN OF FORMS AND SHORES [09]

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 [09]

Carpentry Shop and job mill - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Slab form systems - Sky deck and Multiflex - Customized slab table - Standard Table module forms - Swivel head and uniportal head - Assembly sequence - Cycling with lifting fork - Moving with table trolley and table prop. Various causes of failures – ACI - Design deficiencies - Permitted and gradual irregularities

UNIT - V FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SCAFFOLDS [09]

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

Reference Books :

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

SEMESTER - III

CN20366	BUILDING MANAGEMENT SYSTEMS (Professional Elective)	L	T	P	C
		3	0	0	3

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

CO1: Realize about the Building Management system and Automation applications in BMS.	Understand
CO2: Describe various Sensors and Transducers - Automation components in BMS	Evaluate
CO3: Explain control panel and communication such as HVAC and Modbus.	Understand
CO4: Examine FAS and Security Systems in Building Automation.	Analyse
CO5: Appreciate the efficiency of energy saving systems and control of lighting systems.	Understand

UNIT - I INTRODUCTION TO BUILDING MANAGEMENT SYSTEM [09]

Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS.

UNIT - II AUTOMATION COMPONENTS IN BMS [09]

Temperature Sensors: RTD, Thermistor, Thermocouple, Bimetallic strip - Pressure Sensors: Diaphragm type, piezoelectric sensors – Different types of mounting of pressure sensors in duct, rooms and pipes – Air flow sensor: Anemometer, velocity pressure sensors – Flow sensors: Turbine flow meter, Orifice, Venturi, Pitot tube, ultrasonic flow meter – Different types of mounting for air & water flow meters.

UNIT - III CONTROL PANEL AND COMMUNICATION [09]

HVAC Control Panel, MCC Basics, Panel components; Communication Basics, Networks, BACNet, Modbus, LON.

UNIT - IV FAS AND SECURITY SYSTEMS [09]

Fire, Fire modes – Fire Alarm Systems components: Field components, panel components – FAS Architectures – Access Components, Access control system Design - CCTV camera types and operation – camera selection criteria – CCTV Applications.

UNIT - V ENERGY MANAGEMENT [09]

Energy Savings concept & methods, lightning control, Building Efficiency improvement, Green Building (LEED) Concept & Examples.

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

Reference Books :

- 1 Kenneth Laudon, C. and Jane Price Laudon., Management Information Systems – Organization and Technology, Prentice Hall, Fifteenth Edition, 2018.
- 2 Cibse Guide, H., Building Control Systems, Application Guide, Butterworth-Heinemann, Oxford, First Edition, 2000.
- 3 Reinhold Carlson, A. and Robert Di Giandomenico, A., Access Control, Lightning, Building Management Programs (Hardcover), R.S. Means Company, south Carolina, First Edition, 2007.
- 4 John Wen, T. and Sandipan Mishra., Intelligent Building Control Systems, Springer International Publishing, New York, First Edition, 2017.

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

SEMESTER – III

CN200E1	ENERGY EFFICIENT BUILDINGS	L	T	P	C
	(Open Elective)	3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Explain the energy requirement of the building construction.	Understand
CO2: Obtain the key design principles for energy efficient buildings.	Create
CO3: Articulate the concepts of day lighting and components of daylight factor.	Remember
CO4: Explain the heat transmission, heat control and ventilation.	Evaluate
CO5: Explain about the energy efficient buildings for various zones.	Understand

UNIT - I INTRODUCTION [09]

Energy Required for Building Construction - Heat Transfer – Measuring Conduction – Thermal Storage – Measurement of Radiation – The Greenhouse Effect – Psychometric Chart – Measuring Latent and Sensible Heat. Thermal Comfort – Site Planning and Development – Temperature – Humidity – Wind – Optimum Site Locations – Sun Protection – Types of Shading Devices – Conservation – Heating and Cooling loads.

UNIT - II PASSIVE SOLAR HEATING AND COOLING [09]

General Principles of Passive Solar Heating – Key Design Elements - Direct gain Trombe Walls, Water Walls, Convective Air Loops – Concepts – Case Studies – General Principles of Passive Cooling – Ventilation – Predicting Ventilation in Buildings – Window Ventilation Calculations - Radiation – Evaporation and Dehumidification – Mass Effect – Load Control – Air Filtration and odour Removal – Heat Recovery in Large Buildings.

UNIT - III DAYLIGHTING AND ELECTRICAL LIGHTING [09]

Materials, Components and Details - Insulation – Optical Materials – Radiant Barriers Glazing Materials - Day Lighting – Sources and Concepts – Building Design Strategies – Case Studies – Electric Lighting –Light Distribution – Electric Lighting Control for day lighted buildings – Illumination requirement – Components of Daylight factor – Recommended Daylight Factors – Day Lighting Analysis – Supplementary Artificial Lighting Design.

UNIT - IV HEAT CONTROL AND VENTILATION [09]

Requirements – Heat Transmission Through Building Sections – Thermal Performance of Building Sections – Orientation of Buildings – Building Characteristics for Various Climates – Thermal Design of Buildings Influence of Design Parameters – Mechanical Controls – Examples. Ventilation – Requirements – Minimum Standards for Ventilation – Ventilation Design – Energy Conservation in Ventilating systems – Design for Natural Ventilation.

UNIT - V DESIGN FOR CLIMATIC ZONES [09]

Energy Efficiency – an Overview of Design Concepts and Architectural Interventions – Energy Efficient Buildings for Various Zones – Cold and Cloudy – Cold and Sunny – Composite – Hot and Dry – Moderate – Warm and Humid – Case Studies of Residences, Office Buildings and other Buildings in Each Zones – Energy Audit – Certification.

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

Reference Books :

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

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

SEMESTER - III

CN200E2	ECONOMICS AND FINANCE MANAGEMENT IN CONSTRUCTION (Open Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Apply knowledge on concept of cash flow and payment factors.	Apply
CO2: Evaluate worth analysis and comparing alternatives.	Analyse
CO3: Analyse value added tax and alternative investments.	Analyse
CO4: Recognize the importance of working capital management, budgeting and control.	Remember
CO5: Prepare income, profit and loss statements and implement management accounting.	Understand

UNIT - I BASIC PRINCIPLES [9]

Time Value of Money – Cash Flow diagram – Nominal and effective interest- continuous interest. Single Payment Compound Amount Factor (P/F, F/P) – Uniform series of Payments (F/A, A/F, F/P, A/P) – Problem time zero (PTZ) - equation time zero (ETZ). Constant increment to periodic payments – Arithmetic Gradient (G), Geometric Gradient (C).

UNIT - II COMPARING ALTERNATIVES PROPOSALS [9]

Comparing alternatives- Present Worth Analysis, Annual Worth Analysis, Future Worth Analysis, Rate of Return Analysis (ROR) and Incremental Rate of Return (IROR) Analysis, Benefit/Cost Analysis, Break Even Analysis.

UNIT - III EVALUATING ALTERNATIVE INVESTMENTS [9]

Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax before and after depreciation – Value Added Tax (VAT) – Inflation.

UNIT - IV FUNDS MANAGEMENT [9]

Project Finance – Sources of finance - Long-term and short -term finance, Working Capital Management, Inventory valuation, Mortgage Financing - International financial management- foreign currency management.

UNIT - V FUNDAMENTALS OF MANAGEMENT ACCOUNTING [9]

Management accounting, Financial accounting principles- basic concepts, Financial statements – accounting ratios - funds flow statement – cash flow statement.

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

Reference Books:

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

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SEMESTER - III

CN200E3	STRESS MANAGEMENT (Open Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Recognize your stress triggers and how to manage them.	Apply
CO2: Apply the time management skills in effective manner.	Apply
CO3: Handle the various crisis with full of confidence.	Evaluate
CO4: Solve the various conflicts with humour sense.	Apply
CO5: Improve the personality, creativity and decision making skills.	Create

UNIT - I UNDERSTANDING STRESS [6]

Meaning – Symptoms – Works Related Stress – Individual Stress – Reducing Stress – Burnout

UNIT - II COMMON STRESS FACTORS TIME & CAREER PLATEAUIING [12]

Time Management – Techniques – Importance of planning the day – Time management schedule – Developing concentration – Organizing the Work Area – Prioritizing – Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say 'No'.

UNIT - III CRISIS MANAGEMENT [10]

Implications – People issues – Environmental issues –Psychological fall outs – Learning to keep calm – Preventing interruptions – Controlling crisis – Importance of good communication – Taking advantage of crisis – Pushing new ideas – Empowerment.

UNIT - IV WORK PLACE HUMOUR [5]

Developing a sense of Humour – Learning to laugh – Role of group cohesion and team spirit – Using humour at work – Reducing conflicts with humour.

UNIT - V SELF DEVELOPMENT [12]

Improving Personality – Leading with Integrity – Enhancing Creativity – Effective decision Making – Sensible Communication – The Listening Game – Managing Self – Meditation for peace – Yoga for Life.

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

Reference Books :

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

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SEMESTER – III

CN200E4	MATERIALS MANAGEMENT (Open Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to

- CO1: Identify, classify and organize the different kind of materials.
 CO2: Plan for purchase of materials in an appropriate way.
 CO3: Construct suitable procurement management.
 CO4: Develop proper storage management.
 CO5: Adapt appropriate waste management procedures.

Cognitive Level

- Understand
 Apply
 Evaluate
 Apply
 Create

UNIT - I MATERIAL CLASSIFICATION [9]

Material Classification- Organizing for materials management – basis for forming organizations – conventional and modern approaches to organizing materials management. Materials identification – classifying of materials – codification of materials – standardization – simplification and variety reduction of materials

UNIT - II MATERIAL PURCHASING [9]

Material Purchasing– Planning Purchasing Materials – Norms of Vendor Rating – Cei Methodology – Material Selection And Development – Purchasing Procedures and Methods – Legal Aspects – Insurance of Materials

UNIT - III PROCUREMENT MANAGEMENT [9]

Supply Management – Sources of Supply – Out Sourcing Material Management - Procurement Organization - Procurement Planning - Functions of Material Management - Inventory Control

UNIT - IV STORE MANAGEMENT [9]

Storing of Materials-Management of stores – location – different types of stores – methods of storing – safety and security of materials – stores equipment – materials handling equipment – factors affecting materials handling

UNIT - V WASTE MANAGEMENT [9]

Scrap & Obsolete Materials-Management of surplus obsolete and scrap materials – reasons for accumulation of surplus obsolete and scrap materials – methods of disposal – regulations and procedures

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

Reference(s):

- 1 Arnold., Introduction To Materials Management, Pearson Prentice Hall, New York, Sixth Edition, 2017.
- 2 Chitale, A K. and Gupta, R.C., Materials Management, PHI Learning Private Limited, New Delhi, Second Edition, 2013.
- 3 Richard, J. and Tersine., Principles of Inventory and Materials Management, Prentice Hall, New Delhi, First Edition, 2004
- 4 Datta, A.K., Materials Management: Procedures, Text and Cases, PHI Learning Pvt. Ltd., New Delhi, First Edition, 2004.

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SEMESTER – III

CN200E5	BUILDING ACOUSTICS AND NOISE CONTROL (Open Elective)	L	T	P	C
		3	0	0	3

Course Outcomes : On successful completion of the course, the student will be able to

	Cognitive Level
CO1: Develop knowledge to measurement of sound waves, wavelength and frequencies.	Apply
CO2: Outline the concepts of acoustics principles in building material.	Understand
CO3: Relate acoustics fundamentals in noise control.	Understand
CO4: Utilize the knowledge on insulation of machinery.	Apply
CO5: Construct knowledge to interpolate the basic principles of acoustics design.	Create

UNIT - I INTRODUCTION [9]

Sound waves, Frequency, Intensity, Wave length, Measurement of sound, Decibel scale speech and music frequencies, human ear characteristics-Tone structure.

UNIT - II ACOUSTIC PROPERTIES OF BUILDING MATERIAL [9]

Outdoor noise levels - acceptable indoor noise levels-IS codes –sono meter, determinate of density of a given building material, absorption co-efficient and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

UNIT - III NOISE CONTROL [9]

Types of noises, transmission of noise, transmission loss, noise control and sound insulation, remedial measures and legislation.

UNIT - IV INSULATION OF MACHINERY [9]

Walls/partitions, floors/ceilings, windows/doors, insulating fittings and gadgets machine mounting and insulation of machinery.

UNIT - V BASIC PRINCIPLES IN ACOUSTICS DESIGN [9]

Site selection, shape, volume, treatment for interior surfaces-basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls and theatres for acoustics.

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

Reference Books:

- 1 Croome, D.J., Noise, Building and People, Pergamon Press, Oxford, First Edition, 2010.
- 2 Thomas, D., North wood, Architecture acoustics, Dowden, Hutchinson and Ross Publisher, Pennsylvania, First Edition, 2007.
- 3 Narasimhan, V., An introduction to Building Physics, Kabeer Printing Works, Chennai, First Edition, 2004.
- 4 Smith, B.J. Peters, R. J. and Stephanie Owen., "Acoustics and Noise Control", Taylor & Francis Group, Oxfordshire, Fifth Edition, 2015.

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SEMESTER - III

CN203A1	ENGLISH FOR RESEARCH PAPER WRITING (Audit Course)	L	T	P	C
		2	0	0	0

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

CO1: Identify how to improve the writing skills and level of readability	Understand
CO2: Discover about what to write in each section	Analyze
CO3: Improve skills needed when writing a title	Understand
CO4: Ensure the good quality of paper at very first time submission	Apply
CO5: Prioritize the useful phrases for Research Paper writing	Apply

UNIT - I **[06]**

Planning and Preparations, Word order, Breaking up long sentences, Structuring, Paragraphs and Sentences, Being concise and removing redundancy, Avoiding Ambiguity and vagueness.

UNIT - II **[06]**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and plagiarism, Sections of a paper, abstracts, Introduction, Review of the Literature, methods, results, discussions, conclusions, the final check.

UNIT - III **[06]**

Key skills are needed when writing a title; key skills are needed when writing an abstract, key skill are needed when writing an introduction, skills needed when writing a review of literature.

UNIT - IV **[06]**

Skills are needed when writing the methods, skills needed when writing the results, skills are needed when writing the discussion, and skills are needed when writing the conclusions.

UNIT - V **[06]**

Useful phrases, how to ensure paper is as good as it could possibly the first time submission.

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

Reference Books :

- 1 Goldbort, Writing for Science, Yale University Press, First Edition, 2006.
- 2 Day R, How to write and publish a scientific paper, Cambridge University Press, First Edition, 2006.
- 3 Adrian Wallwork, English for Writing Research Papers, Springer New York, Dordrecht Heidelberg London, First Edition, 2011.
- 4 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2015.

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