ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

(Anjugramam-Kanyakumari Main Road, Palkulam,Variyoor P.O.-629 401, K.K.Dist.)

Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai

Accredited with A+ Grade by NAAC

ME. CONSTRUCTION ENGINEERING AND MANAGEMENT

Curriculum & Syllabus

(*2024-2025 Admitted Students Onwards*)

Vision Statement of RCET

To be an academic institute of continuous excellence towards education and research in rural regime and provide service to nation in terms of nurturing potentially higher social, ethical and engineering companion graduands.

Mission Statement of RCET

To foster and promote technically competent graduands by imparting the state of art Engineering education in rural regime. To enunciate research assisted scientific learning by dissemination of knowledge towards science, agriculture, industry and national security.

Vision of the Department

To develop professional knowledge and competent Civil Engineers to create ethically skilled students for better contribution to the society.

Mission of the Department

M1: To provide technically valuable education for the development of Civil Professionals

M2: To make a platform for the students to explore their potential and critical thinking in research field.

M3: To create awareness and spirit of ethical thoughts in societal concerns for professional development.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

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

PEO3 Become entrepreneurs and develop processes and construction technologies through innovation, by integrating their knowledge in multidisciplinary management to meet

the needs of society and formulate solutions that are technically sound, economically feasible, and socially acceptable.

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

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

PROGRAMME OUTCOMES (PO)

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

PROGRAMME SPECIFIC OUTCOMES (PSOS)

PSO1: In-depth knowledge in the construction management, engineering and technologies necessary to formulate, plan, schedule and execute construction projects

PSO2: Critically analyze and solve construction engineering and management problems by applying the modern tools and concepts of Construction Engineering & Management and make innovative advances in theoretical and practical.

PSO3: Conceptualize the problems in construction industry and develop appropriate solutions which are technically feasible and economically viable with due consideration of sustainability.

CREDIT INFO		
Sl.No	**Category**	**Credits**
1	Foundation Courses (FC)	4
2	Professional Core Courses (PCC)	25
3	Professional Electives (PEC)	15
4	Open Electives (OEC)	3
5	Research Methodology And IPR Courses (RMC)	2
6	Employability Enhancement Courses (EEC)	21
7	Non Credit/ Audit Course	--
Total Credits		**70**

Foundation Courses (FC)							
Sl.No	**Course Code**	**Course Title**	**Course Type**	**L**	**T**	**P**	**Credit**
1	24CN101	Statistical Methods for Engineers	FC	4	0	0	4
Professional Core Courses (PCC)							
Sl.No	**Course Code**	**Course Title**	**Course Type**	**L**	**T**	**P**	**Credit**
1	24CN102	Modern Construction Materials	PCC	3	0	0	3
2	24CN103	Construction Equipment and Management	PCC	3	0	0	3
3	24CN104	Contract Laws and Regulations	PCC	3	0	0	3
4	24CN201	Advanced Construction Techniques	PCC	3	0	0	3
5	24CN202	Project Formulation and Appraisal	PCC	3	0	0	3
6	24CN203	Construction Planning, Scheduling And Control	PCC	3	0	0	3
7	24CN204	Safety Practices and Management	PCC	3	0	0	3
8	24CN131	Construction Engineering Laboratory	PCC	0	0	4	2
9	24CN231	Advanced Computing Techniques Laboratory	PCC	0	0	4	2

Professional Electives Courses (PEC)							
1	24CN211	Advanced Concrete Technology	PEC	3	0	0	3
2	24CN212	Human Resources Management in Construction	PEC	3	0	0	3
3	24CN213	Construction Project Management	PEC	3	0	0	3
4	24CN214	Sustainable Construction	PEC	3	0	0	3
5	24CN221	Economics and Finance Management in Construction	PEC	3	0	0	3
6	24CN222	Design of Energy Efficient Buildings	PEC	3	0	0	3
7	24CN223	Personnel Management in Construction	PEC	3	0	0	3
8	24CN224	Computer Applications in Construction Engineering and Planning	PEC	3	0	0	3
9	24CN241	Quality Control and Assurance in Construction	PEC	3	0	0	3
10	24CN242	Resource Management And Control In Construction	PEC	3	0	0	3
11	24CN243	Shoring, Scaffolding and Formwork	PEC	3	0	0	3
12	24CN244	System Integration in Construction	PEC	3	0	0	3
13	24CN311	Advanced Data Analysis	PEC	3	0	0	3
14	24CN312	Environmental Impact Assessment for Construction Engineers	PEC	3	0	0	3
15	24CN313	Lean Construction Concepts, Tools and Practices	PEC	3	0	0	3
16	24CN314	Maintenance, Repair and Rehabilitation of Structures	PEC	3	0	0	3
17	24CN321	Quality Control and Assurance in Construction	PEC	3	0	0	3
18	24CN322	Digital Design and Construction	PEC	3	0	0	3
19	24CN323	Organizational Behaviour	PEC	3	0	0	3
20	24CN324	Supply Chain Management And Logistics in Construction	PEC	3	0	0	3

Open Electives Courses (OEC)							
1	24CP311	Block Chain Technologies	OEC	3	0	0	3
2	24CP310	Deep Learning	OEC	3	0	0	3
3	24IS342	Vibration and Noise Control Strategies	OEC	3	0	0	3
4	24TE341	Energy Conservation and Management in Domestic Sectors	OEC	3	0	0	3
5	24TE342	Electric Vehicle Technology	OEC	3	0	0	3
6	24TE343	New Product Development	OEC	3	0	0	3
7	24IS341	Micro and Small Business Management	OEC	3	0	0	3
8	24IS343	Intellectual Property Rights	OEC	3	0	0	3
9	24IS344	Ethical Management	OEC	3	0	0	3
10	24EM341	IoT for Smart Systems	OEC	3	0	0	3
11	24EM342	Smart Grid	OEC	3	0	0	3
12	24CP301	Security Practices	OEC	3	0	0	3
13	24CP206	Cloud Computing Technologies	OEC	3	0	0	3
14	24TE344	Design Thinking	OEC	3	0	0	3
15	24CP341	Principles of Multimedia	OEC	3	0	0	3
16	24CP342	Big Data Analytics	OEC	3	0	0	3
17	24CM341	Medical Robotics	OEC	3	0	0	3
18	24EM343	Embedded Automation	OEC	3	0	0	3
19	24TE345	Textile Reinforced Composites	OEC	3	0	0	3
20	24TE346	Nanocomposite Materials	OEC	3	0	0	3
Research Methodology And IPR Courses (RMC)							
1	24RM101	Research Methodology and IPR	RMC	2	0	0	2
Employability Enhancement Courses (EEC)							
1	24CN151	Technical Seminar	EEC	0	0	2	1
2	24CN251	Practical Training -I	EEC	0	0	0	1
3	24CN331	Practical Training –II	EEC	0	0	0	1
4	24CN351	Project Phase I	EEC	0	0	12	6
5	24CN451	Project Phase II	EEC	0	0	24	12
Non Credit/ Audit Course (AC)							
1	24AC201	English for Research Paper Writing	AC	2	0	0	0
2	24AC202	Disaster Management	AC	2	0	0	0
3	24AC203	Constitution Of India	AC	2	0	0	0
4	24AC204	நற்றமிழ் இலக்கியம்	A	2	0	0	0

SEMESTER – I

S. No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY COURSES							
1	24CN101	Statistical methods for Engineers	FC	4	0	0	4
2	24CN102	Modern construction Materials	PCC	3	0	0	3
3	24CN103	Construction equipment and Management	PCC	3	0	0	3
4	24CN104	Contract laws and regulations	PCC	3	0	0	3
5	24RM101	Research Methodology and IPR	RMC	2	0	0	2
6	24CN11X	Professional elective I	PEC	3	0	0	3
7	24AC2XX	Audit course I*	AC	2	0	0	0
LABORATORY COURSES							
8	24CN131	Construction Engineering laboratory	PCC	0	0	4	2
9	24CN151	Technical seminar	EEC	0	0	2	1
Total				**18+2**	**0**	**6**	**21**

*** Audit Course is optional**

SEMESTER – II

S. No.	Course Code	Course Title	Course Category	L	T	P	C
THEORY COURSES							
1	24CN201	Advanced construction Techniques	PCC	3	0	0	3
2	24CN202	Project formulation and Appraisal	PCC	3	0	0	3
3	24CN203	Construction planning, scheduling and control	PCC	3	0	0	3
4	24CN204	Safety practices and Management	PCC	3	0	0	3
5	24CN22X	Professional Elective II	PEC	3	0	0	3
6	24CN24X	Professional Elective III	PEC	3	0	0	3
7	24AC2XX	Audit course II*	AC	2	0	0	0
LABORATORY COURSES							
8	24CN231	Advanced computing techniques laboratory	PCC	0	0	4	2
9	24CN251	Practical training -I	EEC	0	0	0	1
Total				**18+2**	**1**	**4**	**21**

Course Code:	**24CN101**	**Course Title:**	**STATISTICAL METHODS FOR ENGINEERS**
Credits:	**4**	**L – T – P**	**4-0-4**

Course objectives:

To impart knowledge on the

- To develop the ability to apply the concepts of Estimation Theory and Correlation & Regression in Engineering problems.
- To understand basic concepts of Probability theory and Random Variables, how to deal with multiple Random Variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To use the concepts of multivariate normal distribution and principal components analysis.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- ESTIMATION THEORY	**[12hours]**
Estimators: Unbiasedness, Consistency, Efficiency and sufficiency – Maximum likelihood estimation – Method of moments.	

UNIT II ESTIMATION THEORY	**[12hours]**
Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit.	

UNIT III ESTIMATION THEORY	**[12hours]**
Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and partial correlations in terms of lower order co - efficient.	

UNIT IV ESTIMATION THEORY	**[12hours]**
Analysis of variance – One way and two way classifications – Completely randomized design – Randomized block design – Latin square design - 2^2 Factorial design.	

UNIT V ESTIMATION THEORY	**[12hours]**
Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components: Population principal components – Principal components from standardized variables.	

TOTAL: 60 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Obtain the value of the point estimators using the method of moments and method of maximum likelihood.
CO2	Apply the various statistical methods in hypothesis testing for mean and variances of large and small samples.
CO3	Obtain the regression line using the method of least square and also to calculate the partial and multiple correlation coefficient for the given set of data points.
CO4	Apply various ANOVA techniques like CRD, RBD, LSD etc. to obtain the variances.
CO5	Obtain principal component analysis of random vectors and matrices by multivariate statistical methods.

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	**2**	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Web Links and Video Lectures (E-Resources):

1. Probability and Statistics https://nptel.ac.in/courses/111105090

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN102**	**Course Title:**	**MODERN CONSTRUCTION MATERIALS**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNITI SPECIALCONCRETES	**[9 hours]**
Concretes - Behavior of concretes —Properties and Advantages of High Strength and High Performance Concrete–Properties and Applications of Fibre Reinforced Concrete ,Self-compacting concrete, Geo Polymer Concrete, Alternate Materials to concrete on high performance & high Strength concrete.	

UNIT II METALS	**[9 hours]**
Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminum and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.	

UNITIII COMPOSITES	**[9 hours]**
. Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and partial correlations in terms of lower order co - efficient	

UNIT IV NON STRUCTURAL MATERIALS,ASSOCESSORIES AND FINISHES	**[9 hours]**
Introduction of Non-Structural Materials and Criteria for Selection - Types and properties of Water Proofing Materials—Types of Non-Weathering Materials and its uses —Types of Polymer Floor Finishes-Paint-Tiles-AcousticTreatmentmaterials-DryWalls-Anchors.	

UNIT V SMARTANDINTELLIGENTMATERIALS	**[9 hours]**
Types & Differences between Smart and Intelligent Materials – Special features – Nano Concrete - NanoTechnologyinConstruction-Casestudiesshowingtheapplicationsofsmart&Intelligent Materials.	

TOTAL: 45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Apply knowledge of modern materials in production of variety of concrete.
CO2	Apply different type of steel and insulating materials in constructions.
CO3	Explain the composites and chemicals in production of modern concrete.
CO4	Choose the different flooring materials and application of façade materials
CO5	Apply the knowledge of smart and intelligent materials in construction field

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	**Type of assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final Marks**
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

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.

Web Links and Video Lectures (E-Resources):

http://nptel.ac.in/downloads/105106053.

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN103**	**Course Title:**	**CONSTRUCTION EQUIPMENT AND MANAGEMENT**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

- To study and understand the various types of equipment's used for earthwork, tunneling, drilling, blasting, dewatering, material handling conveyors and its applications in construction projects.
- To study and understand appropriate equipment contributes to economy, quality, safety, speed and timely completion of a project

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I CONSTRUCTION EQUIPMENT SELECTION	**[9 hours]**

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

UNIT II EQUIPMENT FOR EARTHWORK	**[9 hours]**

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

UNIT III OTHER CONSTRUCTION EQUIPMENT	[9 hours]
Equipment for Dredging, Trenching, Drag line and clamshells, tunneling – Equipment for Drilling and Blasting - Pile driving Equipment - Erection Equipment - Crane, Mobile crane - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Equipment for Demolition.	

UNIT IVASPHALT AND CONCRETING EQUIPMENT	[9 hours]
Aggregate production- Different Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Pumping Equipment – Ready mix concrete equipment, Concrete pouring equipment. Asphalt Plant, Asphalt Pavers, Asphalt compacting Equipment.	

UNIT V MATERIALS HANDLING EQUIPMENT	[9 hours]
Forklifts and related equipment - Portable Material Bins – Material Handling Conveyors – Material Handling Cranes- Industrial Trucks.	

TOTAL: 45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

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

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped,
Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

REFERENCE BOOKS :

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

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN104**	**Course Title:**	**CONTRACT LAWS AND REGULATIONS**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I CONSTRUCTION CONTRACTS	**[9 hours]**
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 hours]**
Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.	

UNIT III ARBITRATION	[9 hours]
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 IVLEGAL REQUIREMENTS	[9 hours]
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 hours]
Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamil nadu Factory Act – Child Labour Act - Other Labour Laws.	

TOTAL: 45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Examine the elements of concluding, and administering contracts
CO2	Determine about the procedure for tendering and documentation.
CO3	Explain the duties of the arbitrator and legal procedures
CO4	Identify about the labour requirements in terms of tax and cost analysis.
CO5	Analyse about labour regulations and their impact on managing of contracts

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final Marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24RM101**	**Course Title:**	**RESEARCH METHODOLOGY AND IPR**
Credits:	**2**	**L – T – P**	**2-0-2**

Course objectives:

To impart knowledge on the

- To give an overview of the research methodology and explain the technique of defining a research problem
- To explain the functions of the literature review in research.
- To explain various research designs and their characteristics.
- To explain the details of sampling designs, measurement and scaling techniques and also different methods of data collections.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I RESEARCH DESIGN	**[6 hours]**
.Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.	

UNIT II DATA COLLECTION AND SOURCES	**[6 hours]**
Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying	

UNIT III DATA ANALYSIS AND REPORTING	**[6 hours]**
Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.	

UNIT IVINTELLECTUAL PROPERTY RIGHTS	[6 hours]
. Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.	

UNIT V PATENTS	[6 hours]
Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents	

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	To explain various research designs and their characteristics.
CO2	To explain the details of sampling designs, and also different methods of data collections
CO3	To explain the art of interpretation and the art of writing research reports.
CO4	Explain and summarise the need of information about Intellectual Property Right to be promoted among student community in general & engineering in particular
CO5	Relate that IPR protection provides an incentive to inventors for further research work and investment in R & D

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	40
Analyse	20	20	0
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN131**	**Course Title:**	**CONSTRUCTION ENGINEERING LABORATORY**
Credits:	**2**	**L – T – P**	**0-0-4**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

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

   i. Rebound hammer ii. Ultrasonic pulse velocity tester
8. Ultrasonic interferometer – ultrasonic velocity in liquid
9. Electrical conductivity of metals and alloys with temperature-four probe method

10. Resistivity measurements
11. NDT – Ultrasonic flaw detector
12. Strain gauge meter – Determination of Young's modulus of a metallic wire

TOTAL:60 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the high performance Concrete mix design procedure as per ACI IS and BS method
CO2	Experiment with method of testing of workability of flow Characteristics of Self Compacting concrete.
CO3	Estimate the properties of fresh and hardened concrete
CO4	Enumerate the concrete quality through NDT

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

The weightage of Continuous Internal Evaluation (CIE) is 60% and for End Semester Examination (ESE) is 40%

S.No	**Component**	**Type of Assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final Marks**
1.	**Continuous Internal Examination(CIE) - Laboratory**	Continuous Assessment	75	75	100	60
2.		Model Lab Exam	25	25		
3.	**End Semester Examination (ESE)**	Lab Exam	100	40	40	40
					Total	100

Assessment Pattern

Bloom's Category	Terminal Examination
Remember	0
Understand	0
Apply	100
Analyse	0
Evaluate	0
Create	0

Course Code:	24CN151	Course Title:	TECHNICAL SEMINAR
Credits:	1	L – T – P	0-0-2

Course objectives:

To impart knowledge on the

- To work on a specific technical topic in Construction Engineering and Management in order to acquire the skills of oral presentation and to acquire technical writing abilities for seminars and conferences.
- 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.
- Student has to make presentation for 20 minutes followed by 10 minutes discussion using power point
- The student has to make three 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.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. PowerPoint presentation
2. Lab experiment videos
3. Blended Mode of Learning
4. Experiential Learning
5. NPTEL and Other Videos
6. Smart Class Room

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Identify the area of interest of the student.
CO2	Identify the thrust areas by referring journals, conference proceedings etc.
CO3	Demonstrate own ideas in the current advancement in construction industry
CO4	Develop report writing and presentation

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

The weightage of Continuous Evaluation (CE) is 100%

S.No	Type of Assessment	Max Marks	Reduced Marks	Total	Final Marks
1.	Continuous Assessment-I	100	50	100	100
2.	Continuous Assessment-II	100	50		
				Total	100

Course Code:	**24CN201**	**Course Title:**	**ADVANCED CONSTRUCTION TECHNIQUES**
Credits:	**3**	**L – T – P**	**3-0-0**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- SUB STRUCTURE CONSTRUCTION	[9hours]
Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - Piling techniques - Driving well and caisson - sinking cofferdam - cable anchoring and grouting - Driving diaphragm walls, Sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - well points - Dewatering for underground open excavation.	

UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS	[9hours]
Vacuum dewatering of concrete flooring – Concrete paving technology – Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – Erection techniques of tall structures, Large span structures – launching techniques for heavy decks – in-situ prestressing in high rise structures, Post tensioning of slab- Aerial transporting – Handling and erecting lightweight components on tall structures.	

UNIT III CONSTRUCTION OF SPECIAL STRUCTURES	[9hours]
Erection of lattice towers - Rigging of transmission line structures – Construction sequence in cooling towers, Silos, chimney, and sky scrapers - Bow string bridges, Cable stayed bridges – Launching and pushing of box decks – Construction of jetties and break water structures – Construction sequence and methods in domes – Support structure for heavy equipment and machinery in heavy industries – Erection of articulated structures and space decks.	

UNIT IV REHABILITATION AND STRENGTHENING TECHNIQUES	[9hours]
Seismic retrofitting - Strengthening of beams, columns, slab and masonry wall - Protection methods of structures, Mud jacking and grouting for foundation – Micro piling and underpinning for strengthening floor and shallow profile - Sub grade water proofing, Soil Stabilization techniques.	
UNIT V DEMOLITION	**[9hours]**
Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the various processes and techniques involved in sub-structure construction	K2
CO2	Choose the different methods used in super-structure construction.	K3
CO3	Categorize the construction process of special structures and offshore structures with advanced machinery and equipment.	K4
CO4	Discover the idea about the rehabilitation techniques carried out for strengthening of a structure	K4
CO5	Explain about the advanced demolition techniques carried out for dismantling a structure	K2

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	**Type of assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final Marks**
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

1.RobertwadeBrown,Practical foundation engineering handbook, McGrawHill Publications, 2000.
2.Concrete Structures: Repair,RehabilitationandStrengthening,Dr.MohamedA.El-Reedy, 2020
3.Patrick Powers.J., ConstructionDewatering: NewMethods andApplications, JohnWiley& Sons, 1992.
4.Peter H.Emmons,"Concreterepairandmaintenanceillustrated",GalgotiaPublicationsPvt. Ltd., 2001.Press, 2008.
5.Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University, New Delhi, 2008.

Web Links and Video Lectures (E-Resources):

1. Probability and Statisticshttps://nptel.ac.in/courses/111105090

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN202**	**Course Title:**	**PROJECT FORMULATION AND APPRAISAL**
Credits:	**3**	**L – T – P**	**3-0-0**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- PROJECT FORMULATION	**[9hours]**

Project – Concepts – Capital investments - Generation and Screening of Project Ideas - Project identification – Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre- Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report – Different Project Clearances required.

UNIT II PROJECT COSTING	**[9hours]**

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

UNIT III PROJECT APPRAISAL	**[9hours]**

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	[9hours]
Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators – Ratios – financial cost-benefit analysis, social-cost benefit analysis.	

UNIT V PRIVATE SECTOR PARTICIPATION	[9hours]
Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT-Technology Transfer and Foreign Collaboration - Scope of Technology Transfer.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the elements of Project formulation and appraisal.	K2
CO2	Develop the cost analysis report on the project.	K3
CO3	Classify the investment Appraisal the risk analysis and its assessment in practice.	K3
CO4	Analyse Financial aspects of projects	K4
CO5	Analyze the Implementations of Private Sector Participation in construction projects.	K4

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final Marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

1. Barcus,S.W.andWilkinson.J.W.,HandBookofManagementConsulting Services,
   McGraw Hill, New York, first edition, 1995.
2. Joy P.K., Total Project Management - The Indian Context, New Delhi, Laxmi Publications Pvt. Ltd, First edition 2017.
3. PrasannaChandra.,Projects—Planning,Analysis,Selection,Implementation Review, McGrawHillPublishingCompanyLtd.,NewDelhi.,Ninthedition, 2019.
4. United Nations Industrial Development Organisation (UNIDO) Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1995.
5. RainaV.K,"ConstructionManagementPractice—TheinsideStory",Tata McGrawHill Publishing Limited, 2005

Web Links and Video Lectures (E-Resources):

1. Probability and Statisticshttps://nptel.ac.in/courses/111105090

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN203**	**Course Title:**	**CONSTRUCTION PLANNING, SCHEDULING AND CONTROL**
Credits:	**3**	**L – T – P**	**3-0-0**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- CONSTRUCTION PLANNING	**[9hours]**

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

UNIT II NETWORK REPRESENTATION AND ANALYSIS	**[9hours]**

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

UNIT III PRECEDENCE NETWORK ANALYSIS	[9hours]
Introduction to Precedence Diagramming Method (PDM) - PDM network representation, Procedure and Analysis, Issues in PDM, Case Illustrations, Defining Relationship, Project Monitoring and Control Process.	

UNIT IV SCHEDULING PROJECT WORK AND RESOURCE SCHEDULING	[9hours]
Work Scheduling Fundamentals – Bar chart method of Work scheduling – Network Based Project Scheduling – Line of Balance Scheduling for Repetitive Projects - Scheduling with Uncertain Durations – Resources Scheduling Considerations – Crashing and Time/Cost Trade-offs- Case Illustrations – Use of Project management Software for scheduling Process.	

UNIT V PROJECT MONITORING AND CONTROLLING	[9hours]
The Cost Control Approach – Direct and Indirect Cost Control – Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows - Performance Control using Earned Value Management Concepts – Time progress monitoring and Controlling – Time Reduction Techniques – Guidelines for reviewing project Time and Cost Progress.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Identify and estimate the activity in the construction.	K3
CO2	Develop the networking of activities using the critical path method.	K3
CO3	Analyze the project budget required for the particular construction project.	K4
CO4	Explain the various quality control tool required in the construction industry	K2
CO5	Explainthedifferentdatabasesthatcanbemaintainedintheconstruction industry using computers	K2

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	**2**	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Web Links and Video Lectures (E-Resources):

2. Probability and Statisticshttps://nptel.ac.in/courses/111105090

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN204**	**Course Title:**	**SAFETY PRACTICES AND MANAGEMENT**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

- Using risk assessment methods to determine priorities for eliminating hazards and reducing risks
- Improved compliance with laws related to workforce safety and security

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- CONSTRUCTION ACCIDENTS	[9hours]
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	[9hours]
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	**[9hours]**
Safety Culture–Safe Workers– Safety and First Line Supervisors–Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety Personnel– Sub contractual Obligation– Project Coordination and Safety Procedures– Workers Compensation.	

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

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Define all staff their accountabilities and responsibilities for the development and delivery of safety	K2
CO2	Plan the adequate and appropriate safety information and training provided to all staff	K3
CO3	Infer that all staff is provided with adequate and appropriate safety information	K2
CO4	Develop the necessary training to build and maintain a meaningful operational safety	K3
CO5	Make use of the measurement of the organizational safety performance and safety targets are in place.	K3

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	**Type of assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final Marks**
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

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.

Web Links and Video Lectures (E-Resources):

1. Probability and Statisticshttps://nptel.ac.in/courses/111105090

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	24CN231	Course Title:	ADVANCED COMPUTING TECHNIQUES LABORATORY
Credits:	2	L – T – P	0-0-4

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. PowerPoint presentation
2. NPTEL and Other Videos
3. Smart Class Room
4. Flipped Class

List of Experiments:

1. Quantity take off, 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

TOTAL:60 PERIODS

List of Software

•MS OFFICE

•MS PROJECT

•PRIMAVERA SOFTWARE

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Apply computational techniques in optimization and sequencing problems
CO2	Plan using management tools
CO3	Allocate resources for construction projects
CO4	Quantify the volume of activities involved in a project

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

The weightage of Continuous Internal Evaluation (CIE) is 60% and for End Semester Examination (ESE) is 40%

S.No	Component	Type of Assessment	Max Marks	Reduced Marks	Total	Final Marks
1.	**Continuous Internal Examination(CIE) - Laboratory**	Continuous Assessment	75	75	100	60
2.		Model Lab Exam	25	25		
3.	**End Semester Examination (ESE)**	Lab Exam	100	40	40	40
					Total	100

Assessment Pattern

Bloom's Category	Terminal Examination
Remember	0
Understand	0
Apply	100
Analyse	0
Evaluate	0
Create	0

Course Code:	**24CN251**	**Course Title:**	**PRACTICAL TRAINING I**
Credits:	**1**	**L – T – P**	**0-0-2**

Course objectives:

- To train the students in the field work so as to have a first-hand knowledge of practical problems related to Construction Management in carrying out engineering tasks.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. PowerPoint presentation
2. NPTEL and Other Videos
3. Smart Class Room
4. Flipped Class

SYLLABUS:

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

Course Code:	24CN211	Course Title:	ADVANCED CONCRETE TECHNOLOGY
Credits:	3	L – T – P	3-0-3

Course objectives:

To impart knowledge on the

- To develop the ability to apply the concepts of Estimation Theory and Correlation & Regression in Engineering problems.
- To understand basic concepts of Probability theory and Random Variables, how to deal with multiple Random Variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To use the concepts of multivariate normal distribution and principal components analysis.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- CONCRETE MAKING MATERIALS	[9hours]

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

UNIT II MIX DESIGN	[9hours]

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

UNIT III CONCRETING METHODS	[9hours]
Process of manufacturing of concrete, methods of transportation, placing and curing, cracking, plastic shrinkage, Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete	

UNIT IV SPECIAL CONCRETES	[9hours]
Light weight concrete Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self- Compacting Concrete, Geo Polymer Concrete, Waste material-based concrete – Ready mixed concrete.	

UNIT V TESTS ON CONCRETE	[9hours]
Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete. Non-destructive Testing Techniques - microstructure of concrete.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

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

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final Marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in

2. https://swayam.gov.in

Course Code:	**24CN212**	**Course Title:**	**HUMAN RESOURCES MANAGEMENT IN CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

- To impart knowledge on manpower planning.
- To learn the organization structure.
- To study the human relations and organizational behavior.
- To gain knowledge on welfare measures, job evaluation, insurance.
- To understand the managerial roles and development methods

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- MANPOWER PLANNING	**[9hours]**
Manpower planning and forecasting – Recruitment, selection process-Sources-Induction- Orientation and Training -Manpower Planning process - Organising, Staffing, directing, and Controlling - Factors influencing supply and demand of human resources – Role of HR manager – Personnel Principles	

UNIT II ORGANISATION	**[9hours]**
Elements of an organization- Management process in organizations- Planning-Organizing-Staffing- Directing- Controlling – Delegation of authority – responsibility – accountability – lines and staff organization Workforce diversity-international dimensions of Organization- Organizational structure determinants of organizational design	

UNIT III HUMAN RELATIONS AND ORGANISATIONAL BEHAVIOUR	[9hours]
Basic individual psychology – Approaches to job design and job redesign – Self managing work teams – Intergroup – Conflict in organizations – Leadership- Engineer as Manager –aspects of decision making – Significance of human relation and organizational – Individual in organization –Motivation – Personality and creativity – Group dynamics, Team working – Communication and negotiation skills	

UNIT IV WELFARE MEASURES	[9hours]
Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.	

UNIT V MANAGEMENT AND DEVELOPMENT METHODS	[9hours]
Wages and Salary, Employee benefits, Employee appraisal and assessment - Management Development - On-the-job and off-the-job- Management Developments – Performance appraisal in practice. Managing careers: Career planning and development - Managing promotions and transfer of operations – Developing policies, practices and establishing process pattern – Competency up gradation and their assessment – New methods of training and development – Performance Management - Total Quality Management	

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Apply the practices and techniques for evaluating performance and structuring teams
CO2	Explain the role of the leader and leadership principles & attitudes.
CO3	Demonstrate the professional and ethical responsibilities
CO4	Develop commitment to quality, timeliness, and continuous improvement.
CO5	Organize managerial role with emphasis on the management of the human resources.

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	**2**	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

1. D. Longford M.R. Hancock, R. Rellows & A. W. Gale, "Human Recourse Management In Construction" Longman Group Limited, fourth impression 2000.
2. Carleton Counter II and Jill Justice Coulter, "The Complete Standard Hand Book of Construction Personnel Management ", Prentice Hall, Inc., New Jersey, 1989.
3. Memoria,C.B., "Personnel Management", Himalaya Publishing Co., 1997.
4. Andrew,D., Szilagg, "Hand Book of Engineering Management", 1982.
5. Oxley Rand Poslcit, "Management Techniques applied to the Construction Industry",Granda Publishing Ltd., 1980.

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN213**	**Course Title:**	**CONSTRUCTION PROJECT MANAGEMENT**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

- To learn the various stages of a project, project life cycle and the role of project managers.
- To learn the strategic planning and organization of project participants.
- To gain knowledge on project design and construction process.
- To study the utilization of labour, materials & equipments and also cost estimation.
- To learn the thrust areas of construction project management.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- THE OWNERS' PERSPECTIVE	**[9hours]**
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	**[9hours]**
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	**[9hours]**
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, MATERIALS, EQUIPMENTS AND COST ESTIMATION	**[9hours]**
Labour Productivity – Labour Relations in Construction - Problems in Collective Bargaining - Material Procurement and Delivery - Inventory Control - Construction Equipments - Choice of Equipments and Standard Production Rates – 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 - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.	

UNIT V THRUST AREAS IN PROJECT MANAGEMENT	[9hours]
Strengths, Weaknesses, opportunities, threats analysis (SWOT) - S. W. O. T. matrix utility of S. W. O. T. matrix on strategic planning and management - Supply Chain Management (SCM) - Management strategy for implementing SCM in construction organizations and on construction projects - Concepts of critical chain in construction projects based on the theory of constraints -Earned Value Analysis.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Apply the practices and techniques for evaluating performance and structuring teams
CO2	Explain the role of the leader and leadership principles & attitudes.
CO3	Demonstrate the professional and ethical responsibilities
CO4	Develop commitment to quality, timeliness, and continuous improvement.
CO5	Organize managerial role with emphasis on the management of the human resources.

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

1. Prasanna Chandra "Project Planning, Analysis, Selection, Implementation and review" ,Tata McgrawHill, 8h Edition, 2017.
2. Choudhury S, "Project Management", McGraw-Hill Publishing Company, New Delhi, 2017.
3. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", Tata McGraw-Hill Publishing Company, New Delhi, 3rd Edition, 2014.
4. Frederick E. Gould, "Construction Project Management", Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology,4th Edition, 2013.
5. Chris Hendrickson and Tung Au, "Project Management for Construction
6. Fundamental Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2nd edition, 2000.

Activity-Based Learning /Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in

Course Code:	**24CN214**	**Course Title:**	**SUSTAINABLE CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I INTRODUCTION	**[9hours]**
Introduction and definition of Sustainability - Carbon cycle - role of construction material: concrete and steel, etc. - CO2 contribution from cement and other construction materials.	

UNITII MATERIALS USED IN SUSTAINABLE CONSTRUCTION	**[9hours]**
Construction materials and indoor air quality - No/Low cement concrete - Recycled and manufactured aggregate - Role of QC and durability - Life cycle and sustainability.	

UNITIII ENERGY CALCULATIONS	**[9hours]**
Components of embodied energy - calculation of embodied energy for construction materials - Energy concept and primary energy - Embodied energy via-a-vis operational energy in conditioned building - Life Cycle energy use	

UNITIV GREEN BUILDINGS	[9hours]
Control of energy use in building - ECBC code, codes in neighboring tropical countries -OTTV conceptsandcalculations—FeaturesofLEEDandTERI—Griharatings-Roleofinsulationand thermal properties of construction materials - influence of moisture content and modeling – Performance ratings of green buildings-Zero energy building	

UNITV ENVIRONMENTALEFFECTS	[9hours]
Non-renewable sources of energy and Environmental aspects – energy norm, coal, oil, natural gas -Nuclear energy - Global temperature, Green house effects, global warming - Acid rain: Causes, effects and control methods - Regional impacts of temperature change.	

Course outcomes:

On completion of the course, the student will have the ability to:

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

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final Marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

1. Charles J Kibert, Sustainable Construction : Green Building Design & Delivery, 4th Edition , Wiley Publishers 2016.
2. SteveGoodhew, Sustainable Construction Process,WileyBlackwell,UK,2016.
3. CraigA.Langston&GraceK.C.Ding,SustainablePracticesintheBuiltEnvironment, Butterworth Heinemann Publishers, 2011.
4. William P Spence, Construction Materials, Methods & Techniques (3e), Yesdee Publication Pvt. Ltd,2012.

Activity-Based Learning /Practical-Based Learning:

1.http:/nptel.ac.in

2.http:/Swayam.gov.in

Course Code:	**24CN221**	**Course Title:**	**ECONOMICS AND FINANCE MANAGEMENT IN CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

- To learn the basic principles of economics in Civil Engineering.
- To discuss the financial management system.
- To study the fundamentals of financial accounting principles.
- To learn the various alternative proposals methods to financial reporting purposes.
- To study the investment alternatives and property evaluation.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT- I BASIC PRINCIPLES OF ECONOMICS IN CIVIL ENGINEERING	**[9hours]**
Role of civil engineering in industrial development - Advances in civil engineering and engineering economics - Support matters of economy as related to engineering Market demand and supply -Time Value of Money – Cash Flow diagram – Constant increment to periodic payments –Arithmetic Gradient (G), Geometric Gradient (C).	

UNIT-II FINANCIAL MANAGEMENT	**[9hours]**
Project Finance – Sources of finance - Long-term and short -term finance, Working Capital Management, Inventory valuation, Mortgage Financing - Leasing - Equity financing - Internal generation of funds - External commercial borrowings - International financial management - Foreign currency management.	

UNIT-III FUNDAMENTALS OF MANAGEMENT ACCOUNTING	[9hours]
Management accounting, Financial accounting principles- basic concepts, Financial statements –accounting ratios - funds flow statement -Ratio analysis - Investment and financing decision –Financial control Job control and centralized management– Cash flow statement- Balance Sheet -Profit and Loss account.	

UNIT-IV ALTERNATIVES PROPOSALS	[9hours]
Investigation and evaluation – 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- Accounting for tax reporting purposes and financial reporting purposes.	

UNIT-V EVALUATING ALTERNATIVE INVESTMENTS	[9hours]
Alternative investments – Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax before and after depreciation – Valuation- Value Added Tax (VAT) – Inflation.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the elements of construction economics
CO2	Summarize the financial management system and practical problems.
CO3	Apply accounting principles in construction management.
CO4	Explain the alternative methods for proposals
CO5	Plan to Prepare income, profit and loss statements and implement management accounting

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Activity-Based Learning /Practical-Based Learning:

1.http:/nptel.ac.in

2.http:/Swayam.gov.in

Course Code:	**24CN222**	**Course Title:**	**DESIGN OF ENERGY EFFICIENT BUILDINGS**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I INTRODUCTION	**[9hours]**

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

UNIT II PASSIVE SOLAR HEATING AND COOLING	**[9hours]**

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

UNIT III DAYLIGHTING AND ELECTRICAL LIGHTING	[9hours]
Materials, components and details – Insulation – Optical materials – Radiant Barriers – Glazing materials – Glazing Spectral Response – Day lighting – Sources and concepts –Building Design Strategies – Case Studies – Daylight apertures – Light Shelves – Codal requirements – Day lighting design – Electric Lighting – Light Distribution – Electric Lighting control for day lighted buildings – Switching controls – Coefficient of utilization – Electric Task Lighting – Electric Light Zones – Power Adjustment Factors.	

UNIT IVHEAT CONTROL AND VENTILATION	[9hours]
Hourly Solar radiation – Heat insulation – Terminology – Requirements – Heat transmission through building sections – Thermal performance of Building sections – Orientation of buildings – Building characteristics for various climates – Thermal Design of buildings – Influence of Design Parameters – Mechanical controls – Examples. Ventilation – Requirements – Minimum standards for ventilationVentilation Design – Energy Conservation in Ventilating systems – Design for Natural Ventilation Calculation of probable indoor wind speed.	

UNIT IVDESIGN FOR CLIMATIC ZONES	[9hours]
Energy efficiency – An Overview of Design Concepts and Architectural Interventions – Embodied Energy – Low Embodied Energy Materials – Passive Downdraft Evaporative Cooling – Design of Energy Efficient Buildings for Various Zones – Cold and cloudy – Cold and sunny – Composite – Hot and dry – Moderate – Warm and humid – Case studies of residences, office buildings and other buildings in each zones – Commonly used software packages in energy efficient building analysis and design - Energy Audit – Certification.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain environmental energy supplies on buildings
CO2	Explain the passive solar heating, cooling system
CO3	Choose the various aspects of day-lighting and electrical lighting in a building
CO4	Identify and design building ventilation and heat control for in door comfort
CO5	Design a building for climatic zone and apply simulation programs of buildings toper form energy calculations

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final Marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	**2**	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

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

Activity-Based Learning /Practical-Based Learning:

1.http:/nptel.ac.in

2.http:/Swayam.gov.in

Course Code:	**24CN223**	**Course Title:**	**PERSONNEL MANAGEMENT IN CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:
Teaching-Learning Process: Suggested strategies that teachers may use to effectively achieve the course outcomes: 1. Chalk and Talk 2. PowerPoint presentation 3. Lab experiment videos 4. Blended Mode of Learning 5. Experiential Learning 6. NPTEL and Other Videos 7. Smart Class Room 8. Flipped Class

UNIT - I MAN POWER PLANNING	**[9hours]**
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	[9hours]
Organization – Span of Control – Organization Charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection - Placement, Training and Development	

UNIT - III HUMAN BEHAVIOUR	[9hours]
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	[9hours]
Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.	

UNIT - V MANAGEMENT AND DEVELOPMENT METHODS	[9hours]
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

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the various processes in manpower planning, organizational and welfare measures
CO2	Identify the development and operation of human resources.
CO3	Analyze the field of people management and intergroup behavior and conflict in organizations.
CO4	Explain the welfare measures and Laws related to welfare measures.
CO5	Illustrate the elements of management and development methods of the employee services.

COs and POs Mapping:

COs	POs					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	**2**	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

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 Mamoria, C.B., Personnel Management (Text and Cases), Himalaya Publishing House, Bangalore, First Edition, 2019.
4. Dwivedi, R.S., Human Relations and Organisational Behaviour, Macmillian India Ltd., Noida, First Edition, 2008.

Web Links and Video Lectures (E-Resources):

Activity-Based Learning /Practical-Based Learning:

1.http://nptel.ac.in

2.http://Swayam.gov.in

Course Code:	**24CN224**	**Course Title:**	**COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND PLANNING**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

- To acquire knowledge on software requirements in construction process.
- To learn the various optimization techniques.
- To gain knowledge on inventory models.
- To acquire knowledge on project planning and scheduling.
- To understand the various problems in construction field.

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I SOFTWARE APPLICATIONS	[9hours]
Overview of IT Applications in Construction – Construction process – Computerization in Construction – Computer aided Cost Estimation – Developing application with database software.	

UNIT II OPTIMIZATION TECHNIQUES	[9hours]
Linear, Dynamic, and Integer Programming - Branch and Bound Techniques – Application to Production Scheduling, Equipment Replacement, Material Transportation and Work Assignment Problems – Software applications.	

UNIT III INVENTORY MODELS	[9hours]
Deterministic: Economic order quantity (EOQ) model, EOQ with finite supply, EOQ with backorders, EOQ with constraints, All-units quantity discounts model. and Probabilistic Inventory Models - discrete and continuous demand - Software applications..	

UNIT IV SCHEDULING APPLICATION	[9hours]
Program Evaluation & Review Techniques and Critical Path Method – Advanced planning and scheduling concepts – computer application - Project cost considerations, Project duration, and updating and Resource allocation: Resource smoothening and leveling	

UNIT V SEQUENCING AND SIMULATION	[9hours]
Sequencing and replacement model: Sequencing problem -Simulation - Enterprises – Introduction to Enterprise Resource Planning(ERP) systems – Interaction of simulation tool with ERP –Simulation Analysis for ERP – Case Studies.	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Outline the application with database software in construction engineering.
CO2	Apply linear programing techniques in construction
CO3	Summarize the various types of inventory model.
CO4	Apply the scheduling knowledge in engineering projects.
CO5	Solve problems using simulation and ERP systems.

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	**Type of assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final marks**
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

Reference Books:

1. Tarek Hegazy, "Computer-Based Construction Project Management", Pearson New International Edition, 2013.
2. Billy E.Gillet., "Introduction to Operations Research – A Computer Oriented Algorithmic Approach", Mc Graw Hill, 2008.
3. Feigenbaum,L., "Construction Scheduling with Primavera Project Planner" Prentice Hall Inc.,2002.
4. Ming Sun and Rob Howard, "Understanding I.T. in Construction", Spon Press, Taylor and Francis Group, 2004.
5. Paulson, B.R., "Computer Applications in Construction", Mc Graw Hill, 1995

Activity-Based Learning /Practical-Based Learning:

1.http:/nptel.ac.in
2.http:/Swayam.gov.in

Course Code:	**24CN241**	**Course Title:**	**QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1. Chalk and Talk
2. PowerPoint presentation
3. Lab experiment videos
4. Blended Mode of Learning
5. Experiential Learning
6. NPTEL and Other Videos
7. Smart Class Room
8. Flipped Class

UNIT I- QUALITY MANAGEMENT	**[9 hours]**
Introduction – Definitions and Objectives – Factor Influencing Construction Quality - Responsibilities and Authority - Quality Plan - Quality Management Guidelines – Quality Circles	

UNIT II QUALITY SYSTEMS	**[9 hours]**
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 hours]**
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 hours]
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 QULAITY IMPROVEMENT TECHNIQUES	[9 hours]
Selection of New Materials - Influence of Drawings, Detailing, Specification, Standardization - Bid Preparation -Construction Activity, Environmental Safety, Social and Environmental Factors - Natural Causes and Speed of Construction - Life Cycle Costing - Value Engineering and Value Analysis	

TOTAL:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the principles of Quality management
CO2	Illustrate the basic in quality management system.
CO3	Summarize the feasibility in planning in quality procedures.
CO4	Explain the quality assuring and control systems
CO5	Choose the quality techniques to be followed in improving the construction field.

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

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 Code:	**24CN242**	**Course Title:**	**RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1.Chalk and Talk
2.PowerPoint presentation
3.Lab experiment videos
4.Blended Mode of Learning
5.Experiential Learning
6.NPTEL and Other Videos
7.Smart Class Room
8.Flipped Class

UNIT I- RESOURCE PLANNING	**[9 hours]**
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 hours]**
Systems approach, Characteristics of resources, Utilization, measurement of actual resources required, Tools for measurement of resources, Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour.	

UNIT III MATERIALS AND EQUIPMENT	**[9 hours]**
Material: Time of purchase, the quantity of material, sources, Transportation, Delivery, and Distribution Equipment: Planning and selecting by optimistic choice with respect to cost, Time, Source, and handling.	

UNIT IV TIME MANAGEMENT	[9 hours]
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 hours]
Time-cost trade-off, Computer application – Resource levelling, resource list, resource allocation, Resource loading, Cumulative cost – Value Management.	

CO1	Identify the different types of resources in a construction industry
CO2	Analyze the labour productivity and the influencing factors
CO3	Select the equipment output and the operation condition of construction equipment
CO4	Explain the terms of cash inflow, cash outflow, and balance sheet
CO5	Identify the time and cost-related information in a construction sector

Course outcomes:

On completion of the course, the student will have the ability to:

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max Marks	Reduced Marks	Total	Final marks
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

REFERENCES:

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

Course Code:	**24CN243**	**Course Title:**	**SHORING, SCAFFOLDING AND FORMWORK**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1.Chalk and Talk
2.PowerPoint presentation
3.Lab experiment videos
4.Blended Mode of Learning
5.Experiential Learning
6.NPTEL and Other Videos
7.Smart Class Room
8.Flipped Class

UNIT I- PLANNING, SITE EQUIPMENT & PLANT FOR FORM WORK	**[9hours]**

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	**[9hours]**

Lumber - Types - Finish - Sheathing boards working stresses - Repetitive member stress - Plywood- Types and grades - Jointing Boarding - Textured surfaces and strength - Reconstituted wood - Steel - Aluminum - Hardware and

fasteners - Nails in Plywood - Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Vertical loads for design of slab forms - Uplift on shores - Laterals loads on slabs and walls.

UNIT III DESIGN OF FORMS AND SHORES	**[9hours]**
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	**[9hours]**
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	**[9hours]**
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:45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain basic concepts and ideas related with detailed planning of framework
CO2	Classify the materials accessories proprietary products and its pressures
CO3	Make out the comprehensive design aspects of forms and shores
CO4	Apply the knowledge of erecting forms for beams, slabs, columns, walls, and causes of failures.
CO5	Explain the entire system of forms for domes and tunnels, slip forms and scaffolds

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	**Type of assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final marks**
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Bloom's Category	**Continuous Assessment Test**		**Terminal Examination**
	1	**2**	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

REFERENCE BOOKS:

1. Austin, C.K.,Form work for Concrete ,Cleaver -HumePressLtd.,London,1996.
2. Hurd,M.K., Formwork for Concrete,Seventh Edition, American Concrete Institute, Detroit, 2016
3. MichaelP.Hurst, Construction Press, LondonandNewYork,2003.
4. Robert L. Peurifoy and Garold D. Oberlender, Formwork for Concrete Structures, McGraw - Hill, 2010.
5. Kumar NeerajJha, FormworkforConcreteStructures,2017

Course Code:	**24CN244**	**Course Title:**	**SYSTEM INTEGRATION IN CONSTRUCTION**
Credits:	**3**	**L – T – P**	**3-0-3**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1.Chalk and Talk
2.PowerPoint presentation
3.Lab experiment videos
4.Blended Mode of Learning
5.Experiential Learning
6.NPTEL and Other Videos
7.Smart Class Room
8.Flipped Class

UNIT I-STRUCTURALINTEGRATION	**[9 hours]**
Structural System, Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and Specification.	

UNIT II ENVIRONMENTALFACTORS	**[9hours]**
Qualities of enclosure necessary to maintain a specified level of interior environmental quality – weather resistance – Thermal infiltration – Acoustic Control – Transmission reduction – Air quality – illumination – Relevant systems integration with structural systems.	

UNIT III SERVICES	**[9 hours]**
Plumbing—Electricity—Verticalcirculationandtheirinteraction—HeatingVentilationandAir- conditioning Systems in Buildings and implementation techniques in High Rise Buildings.	

UNIT IVMAINTENANCE	**[9 hours]**
Component longevity in terms of operation performance and resistance to deleterious forces – Planning systems for least maintenance materials and construction—access for maintenance— Feasibility for replacement of damaged components —equal life elemental design—maintenance free exposed and finished surfaces.	

UNIT V SAFETYPLANNING	**[9 hours]**
Ability of systems to protect fire – Preventive systems – fire escape system design – Planning for pollutionfreeconstructionenvironmental—HazardfreeConstructionexecutionforHigh Rise Buildings	

TOTAL: 45 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Explain the various construction techniques and incorporate into the building process
CO2	Explain the requirements and elements of HVAC, mechanical, electrical, hydraulic and transportation services in buildings
CO3	Construct and integrate services into high-rise buildings
CO4	Interpret the intricacies of physical installation of services and their critical sequence in the construction maintenance process.
CO5	Explain the safety planning in construction of highrise building

COs and POs Mapping:

COs	**POs**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2	1	3	-	-	-
CO2	2	1	3	-	-	-
CO3	2	1	3	-	-	-
CO4	-	-	1	-	-	-
CO5	2	1	3	-	-	-

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	**Type of assessment**	**Max Marks**	**Reduced Marks**	**Total**	**Final marks**
Continuous Internal Examination (CIE) - Theory	CIE – I	100	50	100	40
	CIE – II	100			
	Assignment/Project	20	10		
	Skill Assessment - I	40	40		
	Skill Assessment - II	40			
End Semester Examination (ESE)	Theory Exam	100	100	100	60
				Total	100

End semester Examination: (QP PATTERN)

- Each unit consists of two 2 marks questions and one 16 marks question (either or).
- All the fifteen questions have to be answered.

Assessment Pattern

Bloom's Category	Continuous Assessment Test		Terminal Examination
	1	2	
Remember	30	30	30
Understand	30	30	30
Apply	20	20	20
Analyse	20	20	20
Evaluate	0	0	0
Create	0	0	0

REFERENCES:

1. A.J.Elderand Martiz Vinden Barg,Handbook of Building Enclosure,McGraw-HillBook Company, 1983.
2. DavidV. Chadderton ,Building Services Engineering,TaylorandFrancis,2013.
3. Safety planning. JaneTaylorand GordonCooke, The Fire Precautions Actin Practices,1987
4. Peter R. Smithand WarrenG.Julian, Building Services, Applied Science PublishersLtd., London, 1993

Course Code:	**24AC201**	**Course Title:**	**ENGLISH FOR RESEARCH PAPER WRITING**
Credits:	**0**	**L – T – P**	**2-0-0**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1.Chalk and Talk
2.PowerPoint presentation
3.Lab experiment videos
4.Blended Mode of Learning
5.Experiential Learning

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING	**[6 hours]**
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	

UNIT II PRESENTATION SKILLS	**[6 hours]**
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction	

UNIT III TITLE WRITING SKILLS	**[6 hours]**
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	

UNIT IV RESULT WRITING SKILLS	**[6 hours]**
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	

UNIT V VERIFICATION SKILLS	[6 hours]
Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission	

TOTAL: 30 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

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

REFERENCES

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

Course Code:	**24AC202**	**Course Title:**	**DISASTER MANAGEMENT**
Credits:	**0**	**L – T – P**	**2-0-0**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

1.Chalk and Talk
2.PowerPoint presentation
3.Lab experiment videos
4.Blended Mode of Learning
5.Experiential Learning

UNIT I INTRODUCTION	**[6 hours]**
Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude	

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS	**[6 hours]**
Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	

UNIT III DISASTER PRONE AREAS IN INDIA	**[6 hours]**
Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics	

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT	**[6 hours]**
Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.	

UNIT V RISK ASSESSMENT	**[6 hours]**
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival	

TOTAL: 30 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

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

REFERENCES

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

Course Code:	**24AC203**	**Course Title:**	**CONSTITUTION OF INDIA**
Credits:	**0**	**L – T – P**	**2-0-0**

Course objectives:

To impart knowledge on the

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

Teaching-Learning Process:
Suggested strategies that teachers may use to effectively achieve the course outcomes:

1.Chalk and Talk
2.PowerPoint presentation
3.Lab experiment videos
4.Blended Mode of Learning
5.Experiential Learning

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION	**[6 hours]**
History, Drafting Committee, (Composition & Working)	

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION	**[6 hours]**
Preamble, Salient Features	

UNIT III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES	**[6 hours]**
Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.	

UNIT IV ORGANS OF GOVERNANCE	**[6 hours]**
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.	

UNIT V LOCAL ADMINISTRATION	**[6 hours]**
District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.	

UNIT VI	[6 hours]
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.	

TOTAL: 30 PERIODS

Course outcomes:

On completion of the course, the student will have the ability to:

CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO4	Discuss the passage of the Hindu Code Bill of 1956.

REFERENCES

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

Course Code:	**24AC204**	**Course Title:**	**நற்றமிழ் இலக்கியம்**
Credits:	**0**	**L – T – P**	**2-0-0**

UNIT I சங்க இலக்கியம்	**[6 hours]**
1. தமிழனின் துவக்க நூல் தொல்காப்பியம் – எழுத்து சொல் பொருள் 2.அகநானூறு (82)- இயற்கை இன்னிசை அரங்கம் 3. குறிஞ்சிப்பாட்டின் மலர்காட்சி 4. புறநானூறு (95,195) போரை நிறுத்தி ஔவையார்	
UNIT II அறநெறித் தமிழ்	**[6 hours]**
1. அறநெறி வகுத்த திருவள்ளுவர் -அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புரவறிதல், ஈகை, புகழ் 2. பிற அற நூல்கள் - இலக்கிய மருந்து - ஏலாதி சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை (தூய்மையை வலியுறுத்தும் நூல்)	

UNIT III இரட்டைக்காப்பியங்கள்	**[6 hours]**
1. கண்ணகியின் புரட்சி சிலப்பதிகார வழக்குரை காதை சமூக சேவை இலக்கியம் மணிமேகலை சிறைக்கோட்டம் அறக்கோட்டமாகிய கதை	

UNIT IV அருள்நெறித் தமிழ்	**[6 hours]**
1. சிறுபாணாற்றுப்படை -பாரி முல்லைக்கு தேர் கொடுத்தது பேகன் மயிலுக்கு போர்வை கொடுத்தது அதியமான் ஔவைக்கு நெல்லி கொடுத்தது, அரசர் பண்புகள் 2. நற்றிணை- அன்னைக்குரிய புன்னை சிறப்பு 3. திருமந்திரம்(617,618)- இயமம் நியமம் விதிகள் 4. தர்மச்சாலையை நிறுவிய வள்ளலார் 5. புறநானூறு- சிறுவனே வள்ளலானான் 6. அகநானூறு (4) - வண்டு நற்றிணை(11) - நண்டு கலித்தொகை(11) - யானை, புறா ஐந்திணை 50(27) - மான் ஆகியவை பற்றிய செய்திகள்	

UNIT V நவீன தமிழ் இலக்கியம்	**[6 hours]**
1. உரைநடை தமிழ் - தமிழின் முதல் புதினம், - தமிழிலன் முதல் சிறுகதை , - கட்டுர இலக்கியம் , - பயண இலக்கியம், - நாடகம். 2, நாட்டு விடுதலைப் போராட்டமும் தமிழ் இலக்கியமும் 3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும் 4. பெண் விடுதலையும் விளிம்பு நிலைநரின் மேம்பாட்டில் தமிழ் இலக்கியமும் 5. அறிவியல் தமிழ் 6. இணையத்தில் தமிழ் 7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்	

TOTAL: 30 PERIODS

தமிழ் இலக்கிய வெளியீடுகள் புத்தகங்கள்

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University) – www.tamilvu.org
2. தமிழ் விக்கிபீடியா (Tamil Wikipedia) -https://ta.wikipedia.org
3. தர்மபுர ஆதீன வெளியீடு
4. வாழ்வியல் களஞ்சியம் தமிழ் பல்கலைக்கழகம் தஞ்சாவூர்
5. தமிழ் கலைக்களஞ்சியம் தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம் தமிழ் பல்கலைக்கழகம் தஞ்சாவூர்