



Your Dreams Our Goal
POORNIMA
UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)



FACULTY OF ENGINEERING AND TECHNOLOGY

PROGRAM:

**M.TECH CONSTRUCTION TECHNOLOGY AND
MANAGEMENT**

SCHEME & SYLLABUS

BOOKLET

BATCH 2025-2027

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Disclaimer: The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

Student Details

Name of Student:

Name of Program:

Semester:

Year:

Batch:

Faculty of:



Your Dreams Our Goal **POORNIMA** **UNIVERSITY**

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Vision

Our vision is to create knowledge based society with scientific temper, team spirit and dignity of labour to face global competitive challenges.

Mission

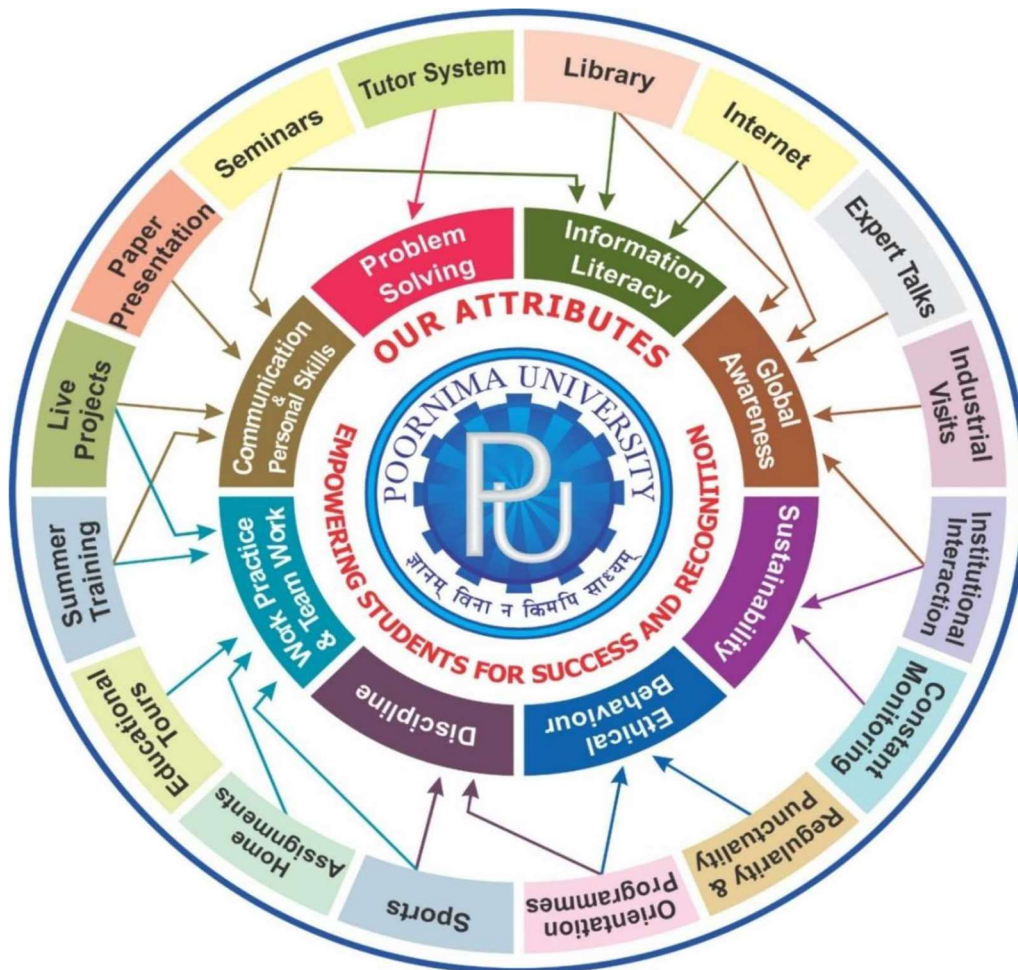
Our mission is to evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide quality education through faculty development, updating of facilities and continual improvement for meeting norms laid down by the government, keeping the stakeholders satisfied. Poornima University has forged industrial alliances with Top MNC's worldwide which assures high educational standards, up to- date and forward-thinking curricula, and professional relevance. At Poornima University you will have a distinct advantage through exposure to the corporate standard environment through industry sponsored infrastructure and expert faculty. The University involves global industry leaders in many ways.

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



About Program and Program Outcomes (PO):

Title of the Program: Masters of Technology

Nature of the Program: M.Tech is a full time two-year program.

Program Outcomes (POs):

Graduates will be able to:

- PO1.** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2.** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3.** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4.** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5.** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6.** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7.** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8.** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9.** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10.** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11.** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

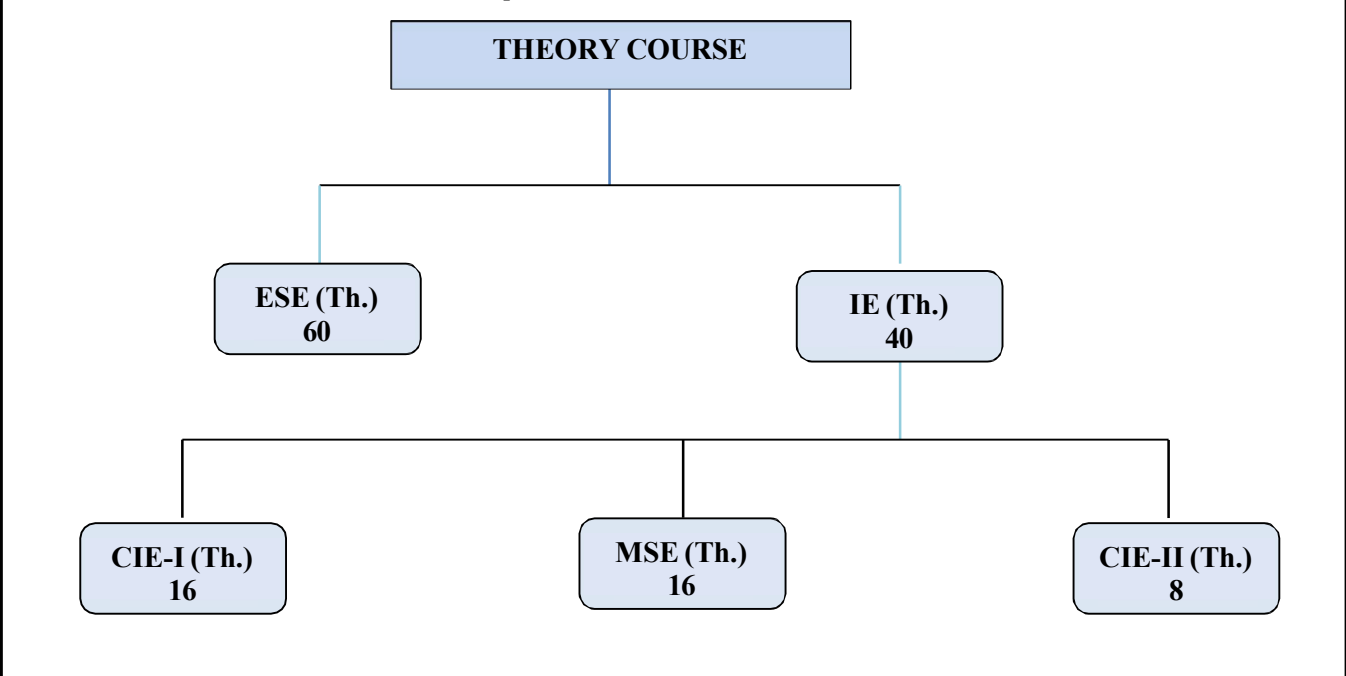
PSO1: Capability to manage large infrastructure projects ensuring safe and cost-effective execution of projects having knowledge of fast track construction and project management.

PSO2: Ability to use building software packages to calculate safe loads and stresses for designing structural members to ensure safety and serviceability.

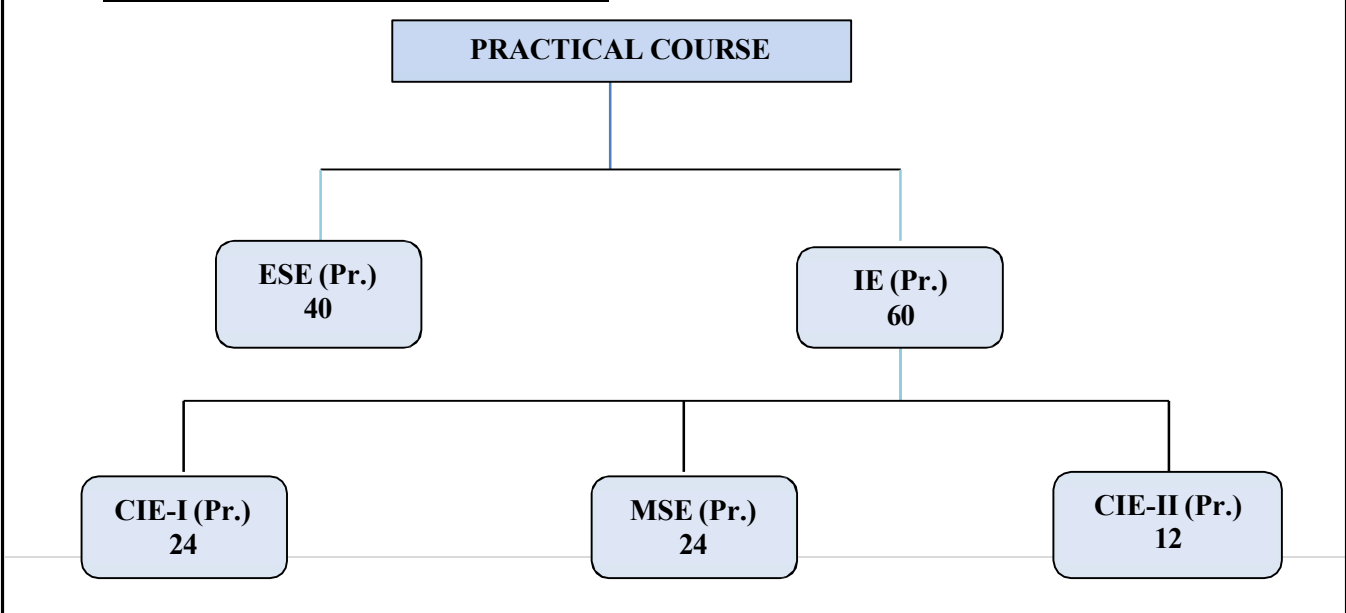
PSO3: Ability to provide innovative solutions for traffic safety and efficiency through intelligent transportation systems, and mitigate the environmental impact of construction by adopting green building concepts.

Examination System :

Marks Distribution of Theory Course:



A. Marks Distribution of Practical Course :



Th.: Theory, **Pr.:** Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

CO Wise Marks Distribution:

Exam Entity	Theory Subject		Practical/ Studio Subject	
	Maximum Marks	CO to be Covered	CO to be Covered	Maximum Marks
CIE-I	16 (8 + 8)	1 & 2	1 & 2	24 (12 + 12)
MSE	16 (8 + 8)	3 & 4	3 & 4	24 (12 + 12)
CIE-II (Activity/ Assignment)	8 (8)	5	5	12 (12)
ESE	60	-	-	40
TOTAL	100	-	-	100

Minimum Passing Percentage in All Exams:

S. No.	Program Name	Minimum Passing Percentage in		
		IE Component	ESE Component	Total Component
1	Course Work for PhD Registration	-	-	50%
2	B. Arch., FIRE Dept. (BBA, B. Com., MBA)	-	45%	50%
3	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH	-	40%	40%
4	B. Tech., B. Des., BVA, BCA, B.Sc., BBA, B.Com., B.A. & any other program	-	35%	35%

SGPA Calculation

$$SGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

$$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i ,

G_i is the Grade Point for the subject I and $i = 1$ to n ,

n = number of subjects in a course in the semester

CGPA Calculation

$$CGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

$$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i ,

G_i is the Grade Point for the subject I and $i = 1$ to n ,

n = number of subjects in a course of all the semesters up to which CGPA is computed

Grading Table:

Table-A

Applicable for B.Arch., FIRE Courses
(BBA, B.Com, MBA), & Ph.D. Course Work

Table-B

Applicable for All Courses except Table-A

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	$90 \leq x \leq 100$
Excellent	A+	9	$80 \leq x < 90$
Very Good	A	8	$70 \leq x < 80$
Good	B+	7	$60 \leq x < 70$
Above Average	B	6	$50 \leq x < 60$
Fail	F	0	$x < 50$
Absent	Ab	0	Absent

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	$90 \leq x \leq 100$
Excellent	A+	9	$80 \leq x < 90$
Very Good	A	8	$70 \leq x < 80$
Good	B+	7	$60 \leq x < 70$
Above Average	B	6	$50 \leq x < 60$
Average	C	5	$40 \leq x < 50$
Pass*	P	4	$35 \leq x < 40$
Fail	F	0	$x < 35$
Absent	Ab	0	Absent

* Not applicable for master programs

CGPA to percentage conversion rule:

$$\text{Equivalent \% of Marks in the Program} = \text{CGPA} * 10$$

Award of Class

CGPA	Percentage	Equivalent Division
$7.50 \leq \text{CGPA}$	75% or more	First Division with Distinction
$6.00 \leq \text{CGPA} < 7.50$	$60\% \leq x < 75\%$	First Division
$5.00 \leq \text{CGPA} < 6.00$	$50\% \leq x < 60\%$	Second Division
$4.00 \leq \text{CGPA} < 5.00$	$40\% \leq x < 50\%$	Pass Class

Guidelines for Massive Open Online Courses (MOOCs)

(Session 2025-27)

Poornima University, in its never ending endeavor to equip students with best-of-class learning and knowledge, has undertaken to include MOOC courses as part of its credit scheme from session 2023-24 onwards. The objective behind this is to enable students to study courses designed by the best teachers in the country and to scale their knowledge base with the rest of learners from the nation. The MOOCs which are included under this scheme is can be chosen from SWAYAM-NPTEL.

1. Introduction of MOOCs: SWAYAM-NPTEL

About SWAYAM-NPTEL

NPTEL (National Programme on Technology Enhanced Learning), is a joint venture of the IITs and IISc, funded by the Ministry of Education (MoE) Government of India, and was launched in 2003. Initially started as a project to take quality education to all corners of the country, NPTEL now offers close to 600+ courses for certification every semester in about 22 disciplines.

Some highlights:

- Largest online repository in the world of courses in engineering, basic sciences and selected humanities and management subjects
- YouTube channel for NPTEL – most subscribed educational channel, 1.3 billion views and 40+ lakhs subscribers
- More than 56000 hours of video content, transcribed and subtitled
- Most accessed library of peer-reviewed educational content in the world
- Translation of more than 12000 hrs of English transcripts in regional Indian languages

NPTEL Online Certification:

The objective of enabling students obtain certificates for courses is to make students employable in the industry or pursue a suitable higher education programme. Through an online portal, 4, 8, or 12-week online courses, typically on topics relevant to students in all years of higher education along with basic core courses in sciences and humanities with exposure to relevant tools and technologies, are being offered. Enrolment to and learning from these courses is free. Following these online courses, an in-person, proctored certification exam is conducted and a certificate is provided through the participating institutions and industry, as applicable.

Some statistics regarding the open online courses since March 2014 till Dec 2021

Completed courses: 3496;

Enrollments across courses: 1.58 CRORE +

Number of exam registrations: 15.1 LAKH +

All the statistics pertaining to completed courses are available at <https://beta.nptel.ac.in/courses>.

All courses are completely free to enroll and learn from. The certification exam is optional and comes at a fee of Rs 1000/course exam.

2. MOOCs at Poornima University:

MOOCs envelops best in class teaching - learning processes along with meeting the requirements of various courses in terms of quality of teaching and evaluation system. To promote the MOOCs among students of Poornima University, it is decided to consider the credits earned through MOOCs.

(a) MOOCs as Credit Courses

(For this document, only those MOOCs will be considered which are available only on NPTEL platforms)

- Credit and Non-credit SWAYAM-NPTEL MOOCs can be opted by anyone, anytime, anywhere and in any language. However, prior-permission of the University Authorities is mandatory if the credits are to be transferred to regular degree.
- As Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards): Open Elective (for batches entered till 2022) courses were available at University level in offline mode till 2022-23 for which relevant booklets were published. From session 2023-24, Multidisciplinary Courses are introduced in lieu of open elective courses as per NEP 2020. These courses carry 02 credits. These category/type of courses (similar/different) are available as MOOC courses on SWAYAM-NPTEL platform which are being introduced from session 2023-24 onwards for all the students. The respective Deans / HODs shall provide all the information to all the students pertaining to MOOCs as per details given below:
 1. Deans / HODs shall prepare a list of up to 10 appropriate MOOC courses (From NPTEL Only) of Minimum 02/03 credits each, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
 2. After approval, the respective Deans / HODs shall circulate a notice to all their respective students so that they can select any one course from the list, the credits (only 02) of which will be counted against Open Elective/ Multidisciplinary courses pertaining to that particular semester.
 3. The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean and provide the academic support to students as per requirement.

(b) Important points related to MOOCs at Poornima University

- Only one MOOC shall be allowed in a particular semester for the purpose of credit transfer in the beginning.
- No attendance will be taken for MOOC courses.
- The method of assessments of MOOC such as assignments and examination are completely associated with that particular MOOC and no internal exam (IE component) will be conducted by the department as well as by the Examination Cell.
- The respective Dean / HOD must submit the detail of course i.e., code, name and credit of MOOC opted against that particular course in particular semester attached with highlighting in the related examination scheme of syllabus of that semester signed by BOS Convener / HoD and Dean of Faculty to the office of Pro-President before commencement of the classes.
- The center of examination for MOOCs will be finalized by SWAYAM-NPTEL. All the responsibility related to registration for MOOCs, timely submission of assignments, examinations etc. will be borne by the students only.
- NPTEL will award a certificate to all the students passing the examination.
- The list of registered students in MOOC along with name of course will be submitted to the Examination Cell by the Deans / HoDs before commencement of the classes.

- An ESE Exam of each said MOOC course will also be conducted by the University as per University norms.
- The award of marks/grading will be computed as given below:

Award of marks/grading	Remarks
1. 20% weightage taken from MOOC Certificate +80% weightage taken from ESE Exam of Poornima University OR 2. 100% of weightage taken from MOOC Certificate Note: The Higher Marks/Grades of the above two will be considered	The Certificate of MOOC to be Submitted as per date notified by COE, Poornima University

- Any student who would not be able to clear/pass the said course, will be required to appear as a back exam candidate of the University as per PU norms. Students who have not passed the MOOC exam are required to register and participate in the next semester for either the same subject or a similar subject (Ensuring at least 60% of the syllabus matches with the back subject and also approved by respective Dean) offered through NPTEL.
- The scorecard and related certificate of MOOC along with a consolidated list of students with marks of assignment and final exam will be submitted to the examination cell by the concerned Dean / HOD for further process. It is also recommended that alteration/changes/scaling in marks obtained by the students in any MOOC will not be considered.
- The exam registration fee of MOOC up to Max. INR 1000/- will be reimbursed to the student only after successful completion of the course in first attempt and submission of the fee receipt, score-card and certificate of the MOOC to the concerned department within stipulated time after declaration of the results.
- There will be no provision of re-evaluation of MOOC.

NOTE: This is to be noted that the procedure for getting approval from BOS, Faculty Board, Academic Council and BoM is to be followed as per regular process.

Attached Items:

Ability Enhancement Courses	Annexure-1
Value Added Course Booklet	Annexure-2

POORNIMA UNIVERSITY, JAIPUR									
Faculty of Engineering and Technology									
Name of Program:	M.Tech. in Construction Technology and Management			Duration: 2 Years		Total Credits: 81			
Teaching Scheme for Batch 2025-27									
Semester-I									
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	Theory								
MCMCCV1101	Construction and Safety Management	3	-	-	-	40	60	100	3
MCMCCV1102	Advanced Construction Technology	3	-	-	-	40	60	100	3
MCMCCV1103	Construction Costing and Financial Management	3	-	-		40	60	100	3
A.2	Practical								
MCMCCV1201	Project Management Lab - I	-	-	2		60	40	100	1
B.		Minor Stream Courses/ Department Electives I and II							
B.1	Theory								
MCMECV1101	Construction Project Management	3	-	-	-	40	60	100	3
MCMECV1102	Energy Conservation Techniques in Building Construction			-	-	40	60	100	
MCMECV1103	Disaster Management			-	-	40	60	100	
MCMECV1104	Maintenance and Rehabilitation of Structures			-	-	40	60	100	
MCMECV1105	Remote Sensing and GIS Applications	3	-	-	-	40	60	100	3
MCMECV1106	Statistical Methods and Queuing Theory					40	60	100	
MCMECV1107	Mechanization in Construction			-	-	40	60	100	
MCMECV1108	Technology Management			-	-	40	60	100	
MCMECV1109	Green Buildings and Services			-	-	40	60	100	
B.2	Practical								
	-	-	-	-	-	-	-	-	-
C		Multidisciplinary Courses							
MULEBX1109	Research Methodology	3	-	-	-	40	60	100	3
D		Ability Enhancement Courses (AEC)							
MUACHM1201	Communication Skill - I	-	-	2		60	40	100	1
E		Skill Enhancement Courses (SEC)							
MULCSE1201	Skill Enhancement Technical Course	-	-	4	-	60	40	100	2
F		Value Added Courses (VAC)							
	-	-	-	-	-	-	-	-	-
G		Summer Internship / Research Project / Dissertation							
MCMCCV1401	Seminar-I	-	-	4	-	60	40	100	2
Total		18	0	12					24
Total Teaching Hours		30							

POORNIMA UNIVERSITY, JAIPUR									
Faculty of Engineering and Technology									
Name of Program:	M.Tech. in Construction Technology and Management							Duration: 2 Years	
Total Credits: 81									
Teaching Scheme for Batch 2025-27									
Semester-II									
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A. Major (Core Courses)									
A.1 Theory									
MCMCCV2101	Quality Control and Assurance in Construction	3	-	-		40	60	100	3
MCMCCV2102	Construction Equipment and Management	3	-	-		40	60	100	3
MCMCCV2103	Environmental Engineering & Management	3	-	-		40	60	100	3
A.2 Practical									
MCMCCV2201	Project Management Lab - II	-	-	2		60	40	100	1
B. Minor Stream Courses/ Department Electives I and II									
B.1 Theory									
MCMECV2101	Economics and Finance Management in Construction.	3	-	-	-	40	60	100	3
MCMECV2102	Building Maintenance			-	-	40	60	100	
MCMECV2103	Rural Construction Technology			-	-	40	60	100	
MCMECV2104	System Integration in Construction								
MCMECV2105	Infrastructure Development	3	-	-	-	40	60	100	3
MCMECV2106	Construction Safety			-	-	40	60	100	
MCMECV2107	Project Risk Analysis and Mitigation Techniques			-	-	40	60	100	
MCMECV2108	Management and Project Planning in Construction								
B.2 Practical									
	-	-	-	-	-	-	-	-	-
C. Multidisciplinary Courses									
MTEEMC2121	MOOC Course - I	3	-	-	-	-	-	-	3
D. Ability Enhancement Courses (AEC)									
MUACHM2207	Communication Skill - II	-	-	2		60	40	100	1
E. Skill Enhancement Courses (SEC)									
MULCSE2201	Skill Enhancement Technical Course-II			4		60	40	100	2
MULCCV2202	Review/Research Paper-I			2		60	40	100	1
F. Value Added Courses (VAC)									
	-	-	-	-	-	-	-	-	-
G. Summer Internship / Research Project / Dissertation									
MCMECCV2401	Seminar-II	-	-	2	-	60	40	100	1
Total		18	0	12					24
Total Teaching Hours		30							24

POORNIMA UNIVERSITY, JAIPUR									
Faculty of Engineering and Technology									
Name of Program:	M.Tech. in Construction Technology and Management							Duration: 2 Years	
	Total Credits: 81								
Teaching Scheme for Batch 2025-27									
Semester-III									
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	Theory								
A.2	Practical								
MCMCCV3401	Review/Research Paper-II	0	0	2		60	40	100	1
MCMCCV3402	Industrial Technical Seminar	0	0	4		60	40	100	2
B.		Minor Stream Courses/ Department Electives/ <u>Open Elective</u>							
B.1	Theory								
C		Multidisciplinary Courses							
	MOOC Course - II	3	-	-	-	-	-	-	3
D		Ability Enhancement Courses (AEC)							
E		Skill Enhancement Courses (SEC)							
-	-	-	-	-	-	-	-	-	-
F		Value Added Courses (VAC)							
G		Summer Internship / Research Project / Dissertation							
MCMCCV3403	Internship	-	-	12	-	40	60	100	6
MCMCCV3404	Dissertation Part - I	-	-	12	-	60	40	100	6
Total		3	0	30					18
Total Teaching Hours		33							

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Faculty of Engineering and Technology									
Name of Program:	M.Tech. in Construction Technology and Management							Duration: 2 Years	
	Total Credits: 81								
Teaching Scheme for Batch 2025-27									
Semester-IV									
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	Theory								
-	-	-	-	-	-	-	-	-	-
A.2	Practical								
-	-	-	-	-	-	-	-	-	-
B.		Minor Stream Courses/ Department Electives/ <u>Core Elective</u>							
B.1	Theory								
-	-	-	-	-	-	-	-	-	-
B.2	Practical								
-	-	-	-	-	-	-	-	-	-
C		Multidisciplinary Courses							
-	-	-	-	-	-	-	-	-	-
D		Ability Enhancement Courses (AEC)							
-	-	-	-	-	-	-	-	-	-
E		Skill Enhancement Courses (SEC)							
-	-	-	-	-	-	-	-	-	-
F		Value Added Courses (VAC)							
-	-	-	-	-	-	-	-	-	-
G		Summer Internship / Research Project / Dissertation							
MCMCCV4401	Dissertation Part - II	-	-	30	-	250	250	500	15
Total		0	0	30					15
Total Teaching Hours		30							

POORNIMA UNIVERSITY, JAIPUR									
Faculty of Engineering and Technology									
Name of Program:	M.Tech. in Construction Technology and Management Duration: 2 Years Total Credits: 81								
Teaching Scheme for Batch 2025-27									
Semester-I									
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
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MCMCCV1102	Advanced Construction Technology	3	-	-	-	40	60	100	3
MCMCCV1103	Construction Costing and Financial Management	3	-	-		40	60	100	3
A.2	Practical								
MCMCCV1201	Project Management Lab - I	-	-	2		60	40	100	1
B.		Minor Stream Courses/ Department Electives I and II							
B.1	Theory								
MCMECV1101	Construction Project Management			-	-	40	60	100	
MCMECV1102	Energy Conservation Techniques in Building Construction	3	-	-	-	40	60	100	3
MCMECV1103	Disaster Management			-	-	40	60	100	
MCMECV1104	Maintenance and Rehabilitation of Structures			-	-	40	60	100	
MCMECV1105	Remote Sensing and GIS Applications			-	-	40	60	100	
MCMECV1106	Statistical Methods and Queuing Theory					40	60	100	
MCMECV1107	Mechanization in Construction	3	-	-	-	40	60	100	3
MCMECV1108	Technology Management			-	-	40	60	100	
MCMECV1109	Green Buildings and Services			-	-	40	60	100	
B.2	Practical								
	-	-	-	-	-	-	-	-	-
C		Multidisciplinary Courses							
MULEBX1109	Research Methodology	3	-	-	-	40	60	100	3
D		Ability Enhancement Courses (AEC)							
MUACHM1201	Communication Skill - I	-	-	2		60	40	100	1
E		Skill Enhancement Courses (SEC)							
MULCSE1201	Skill Enhancement Technical Course	-	-	4	-	60	40	100	2
F		Value Added Courses (VAC)							

	-	-	-	-	-	-	-	-	-
G		Summer Internship / Research Project / Dissertation							
MTECCV1401	Seminar-I	-	-	4	-	60	40	100	2
Total		18	0	12					24
Total Teaching Hours		30							

PO's and PSO's are as follows

PO No.	PO's
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. Considerations.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO No.	PSO's
1	A civil engineering graduate is efficient in fundamentals of civil engineering, mathematical & scientific reasoning and are able to plan, design the building structure, roads, sewage and water supply networks & other component of infrastructure system considering environmental, safety & health aspects.
2	A civil engineer is able to use modern tools, techniques, software's to solve complex engineering problems
3	A civil Engineer able to prepare BOQ & cost estimation & able to execute the projects in lined with set project goals.
4	A civil engineer is able to compile detailed project report & give technical specifications to provide required quality of work.
5	A civil engineer is able to access the quality of material used for construction & able to find out deviations & able to suggest preventative and corrective measures for sustainable development.

Major Core Courses

Code: MCMCCV1101

Construction and Safety Management

3 Credits [LTP 3:0:0]

COURSE OVERVIEW AND OBJECTIVES: To bring about an exposure to principle of modern day construction, Network Analysis, cost optimization, site layout, inspection, supervision and quality control, safety in construction, labour laws and Acts.

COURSE OUTCOMES:

After completion of this course, student will be able to:

CO No.	Description
CO1	Understand the concepts and principles of Modern day Construction
CO2	Find the network analysis and time cost optimization of the projects.
CO3	Understand the site layout, inspection, supervision and quality control.
CO4	Implement the safety in construction
CO5	Implement the labour laws and Acts

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	INTRODUCTION, CONSTRUCTION CONTRACTS AND SPECIFICATION	9
2.	CONSTRUCTION PLANNING AND TIME-COST OPTIMIZATION	9
3.	LABOUR LAWS, ACTS AND PROJECT MANAGEMENT	10
4.	SITE LAYOUT, SUPERVISION, INSPECTION AND QUALITY CONTROL	10
5.	SAFETY IN CONSTRUCTION AND FIRE SAFETY	10

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction, Construction Contracts and Specification
	Introduction: Definition, functions and scope of construction management; scientific methods of management; construction team. Construction Contracts and Specifications: Types of construction contracts; contract documents; Specifications; general and special conditions; contract management; arbitration and settlement.
2.	Construction Planning and Time-cost Optimization
	Construction Planning and Network Techniques: Pre-tender planning; contract planning; planning and scheduling construction jobs by bar charts; Planning and scheduling construction jobs by critical path network techniques; allocation of resources; techniques of development and analysis of PERT/CPM networks for building project, bridge project and industrial shed constructions; updating of network; examples and case studies; Computer software for network analysis Time-cost Optimization: Direct cost, indirect cost, total cost; purpose, stages and methods of cost control techniques of time cost optimization; examples and case studies.

3.	Labour Laws, Acts and Project Management
	Labour Laws and Acts: Different Labour Laws and Acts and their uses in construction project management Project Management: Feasibility study; project reports; progress reports; monitoring and controlling project activities.
4.	Site Layout, Supervision, Inspection and Quality Control
	Site Layout: Principles governing site lay out; factors effecting site lay out; preparation of site lay out. Supervision, Inspection and Quality Control: Supervisor's responsibilities; keeping records; control of field activities handling disputes and work stoppages; storage and protection of construction materials and equipment; testing and quality control. Purpose of inspection: Inspection of various components of construction; reports and records; statistical quality control.
5.	Safety in construction and Fire Safety
	Safety in Construction: Safety: importance of safety, accident-prone situations at construction site i.e, safety measures for excavation, drilling/blasting, scaffolding/formwork, hoisting & erection demolition and hot bituminous work. Fire Safety: Safety record of construction industry, safety campaign

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publications
1.	Construction Planning and Management	Gahlot, P.S. & Dhir B.M.	Latest	New Age International
2.	Project Planning & Control with PERT & CPM	Punmia, B.C.; Khandelwal, K.K.	Latest	Laxmi Publications.
3.	Construction Project Management – Planning Scheduling and Controlling	Chitkara, K.K	Latest	Tata McGraw Hill

Websites

<https://nptel.ac.in/courses/122107036/>
<https://nptel.ac.in/courses/122104017/>
<https://nptel.ac.in/courses/111107127/>
<https://nptel.ac.in/courses/111107119/>
<https://nptel.ac.in/courses/111105035/>
<https://nptel.ac.in/courses/111105134/>
<https://nptel.ac.in/courses/111105121/>

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	3	1	-
CO2	-	2	2	-	3
CO3	1	1	-	3	2
CO4	1	3	-	2	-
CO5	1	3	-	2	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To bring about a complete understanding of advanced construction techniques in sub structure super structure and repair construction

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Understand the necessity and behaviour of the composite construction (Steel and Concrete) and their application.
CO2	Various types of special foundations and their suitability and application areas.
CO3	Various aspects of high rise construction and special methods/techniques deployed in it.
CO4	Understand the necessity of Pre-fab construction, various components and different aspects in planning and execution of it.
CO5	List various new materials like. Geo-synthetics, polymers, Special Coatings etc. and their properties and suitability for use

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	COMPOSITE STRUCTURES AND NEW TECHNOLOGIES	9
2.	SPECIAL FOUNDATIONS	10
3.	HIGH RISE CONSTRUCTION	10
4.	PREFABRICATED CONSTRUCTION	10
5.	ADVANCED CONSTRUCTION MATERIALS	9

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Composite Structures and New Technologies
	<p>Composite Structures in Buildings : Introduction to steel - concrete composite construction - theory of composite structures –Comparison of composite and non-composite, Introduction to steel - concrete - steel sandwich construction. Materials in composite construction, Composite columns: Types-Design of concrete encased columns, concrete filled tubular columns. Earthquake resistant design of masonry structures.</p> <p>New Technologies in Road and Bridges : Recycling of Pavements – purpose, usage of old material, reclaiming bitumen, usage of granular material. Cold Mix Technologies, Warm Mixes -</p>

2.	Special Foundations
	<p>Special Foundations :</p> <p>Necessity for special foundations, Problems in expansive Soils , Loose sand deposits and organic soils, Black cotton soils - soil potential to expand and related soil properties , measures to counteract the problems in expansive soils. ; Frost action and measures to counter the related problems. Foundations for chimney, cooling towers, telecommunication/transmission towers, foundations for underground structures, coastal and off shore structures in different soil conditions, gravity platforms, Raker. Dewatering and its various methods.</p>
3.	High Rise Construction
	<p>High Rise Construction :</p> <p>High rise buildings; architectural & structural aspects; special features of construction; tall chimneys, components, design aspects; slip form method , lift slab method; special problems of high rise construction.</p>
4.	Prefabricated Construction
	<p>Prefabricated Construction :</p> <p>Advantages of pre-fabricated construction; Basic elements , selection of structural elements; design aspects; assembly of precast elements; jointing , modular co-ordination and tolerances; structural systems for buildings; single and multi- storey building systems; methods and equipment's for handling and placement. Applications for rural and military areas.</p>
5.	Advanced Construction Materials:
	<p>Advanced Construction Materials:</p> <p>Geo-synthetics: various, types; geo-textiles, geo-grids, geo-membranes, geo-cell, geo- composites; functions and general applications, advantages, properties of geo- textiles, epoxy , resins, polymers, grouts and anchors, special flooring materials, sealants and adhesives, protective coatings. Micro-Silica in Concrete</p>

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1.	Modern Foundations - Introduction to Advanced Techniques	Naiman P Kurian	Latest	Tata McGraw Hill
2.	Design of Foundation Systems	Kurian NP	Latest	Alpha Science Publisher Narosa Publications
3.	Foundation Engineering Handbook	Fang H Sai-Yang.	Latest	CBS Publishers
4.	Construction Technology	Sarkar & Sarswati. ,	Latest	Oxford University Publishers
5.	Composite Structures of Steel and Concrete	Johnson R.P,	Latest	Blackwell Scientific Publications.

Websites

<https://nptel.ac.in/courses/112104118/>
<https://nptel.ac.in/courses/112105171/>
<https://nptel.ac.in/courses/103104043/>
https://swayam.gov.in/nd1_noc19_ce28/preview
<https://nptel.ac.in/courses/105103192/>
<https://nptel.ac.in/courses/105101082/>
<https://nptel.ac.in/courses/105103095/>
<https://nptel.ac.in/courses/112105269/>
<https://nptel.ac.in/courses/112105183/>

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	-	1
CO2	1	3	-	2	1
CO3	3	1	1	1	-
CO4	3	2	2	-	-
CO5	3	2	-	-	2

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To enable essential and practical understanding of the basic energy requirements in buildings for different applications
 2. To understand the external and internal energy processes which control the built environment
 3. To study emerging technologies in building energy management.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Understand the various Construction Costing.
CO2	Infer the knowledge on using proper Cash flow
CO3	Understand the interaction of various Cash and payment of works.
CO4	Analyze of proper methodology for Material Management.
CO5	Analyze the Financial Management.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Construction Costing	6
2	Cash flow	8
3	Cash and payment of works	8
4	Material Management	6
5	Financial Management	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Construction Costing
	Construction Costing: Costing of construction Works; different methods of costing, cost elements in a projects; analysis of rates; non-scheduled items of work; cost estimation for a small construction job; purpose, methods and stages of cost control; cost monitoring; cost forecasting methods; variations in individual items of work and their effect on total contract price; valuation of variations. Methods of measurement of earthwork ,RCC , Brickwork, Woodwork joinery, steel and iron work plastering/ painting and white/colour washing & painting
2	Cash flow
	Cash flow: Determining the funds required for a construction job; preparing cash flow statements; cash inflow and outflow during contract period; project expectations.
3	Cash and payment of works

	Cash and payment of works; Precautions in custody of cash, imprest account and temporary advance; maintenance of temporary advance; and advance account; different types of payment, first, running, advance and final payments.
4	Material Management
	Material Management: Objectives and scope of material management classification, codification, ABC analysis, standardization and substitution; introduction to inventory control; stores management; organization and lay out; receipt, inspection and issue; care and safety; store records and store accounting.
5	Financial Management
	Financial Management: Meaning and scope financial statement analysis, funds flow analysis, Capital budgeting, cost benefit analysis.

C. RECOMMENDED STUDY MATERIAL:

No	Reference Book	Author	Edition	Publisher
1	Integrated cost and schedule control for construction projects.	Mueller, F.W	Latest	by CRC Press,
Websites				
https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf				
http://www.nptelvideos.in/2012/11/building-materials-and-construction.html				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	2	2	-
CO2	2	-	1	3	1
CO3	1	-	3	1	-
CO4	2	-	3	-	-
CO5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

Code: MCMCCV1201

Project Management Lab-1

1Credits [LTP: 0-0-2]

A. DETAILED SYLLABUS

List of Experiments
Design as per syllabus of theory

Department Elective-I

Code: MCMECV1101	CONSTRUCTION PROJECT MANAGEMENT	3 Credit [LTP: 3-0-0]
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COURSE OBJECTIVE: To study the elements of construction project management consisting of owners' perspective, organization, design and construction procedures, resource utilization and cost estimation.

COURSE OUTCOMES:

After completion of the course, students will be able to:

CO	Description
CO1	Understand the Concept of a Project–Characteristic features–Project Life cycle–Phases–Project Management
CO2	Development of project plan and objectives–programming–scheduling–project organization–organization.
CO3	Assess as project execution plan–project procedure manual–sub systems of project management
CO4	Evaluate of Project direction – direction during production stage – value engineering review
CO5	Analyze of Labour requirements-Labour productivity–site productivity.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Introduction to Project	7
2	Role of Project Management	11
3	Working Systems	11
4	Project Direction	10
5	Resource Management	9

B. DETAILED SYLLABUS

Unit	Details of Unit
1.	INTRODUCTION TO PROJECT
	Concept of a Project–Characteristic features–Project Life cycle–Phases–Project Management–tools and techniques for project management– role of project managers.
2.	ROLE OF PROJECT MANAGEMENT
	Development of project plan and objectives–programming–scheduling–project organization–organization and project team–role of communication in project management– controlling systems.
3.	WORKING SYSTEMS
	Working systems–Characteristics–class of systems– design of systems– work break down system (WBS)–project execution plan–project procedure manual–sub systems of project management- monitoring of projects- networks–monitoring contracts.
4.	PROJECT DIRECTION
	Project direction – direction during production stage – value engineering review – stages – directives – project coordination – procedure – interface management – project control –

	scope for progress control – overall project progress control – stages – methods
5.	RESOURCE MANAGEMENT
	Basic concept-Labour requirements-Labour productivity–site productivity – Equipment Management – Material management- procurement organization – procurement planning – functions of material management – inventory control

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1	“Project Planning, Analysis, Selection, Implementation and review”	Prasanna Chandra	Latest	Blackwell Science Ltd
2	‘Construction Project Management	Frederick E. Gould,	Latest	Taylor & Francis Group
3	Project Management	Choudhury, S	Latest	Tata McGraw-Hill Publishing company New Delhi
Websites				

COs AND POs MAPPING

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

COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	-	2	-	-
CO2	2	3	-	2	-
CO3	3	3	-	2	-
CO4	3	1	1	1	-
CO5	3	2	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Entrepreneur

COURSE OBJECTIVE: To bring an about exposure to different sources and production systems of energy and their effective management adopting appropriate design methodology in construction.

COURSE OUTCOMES

After completion of the course, students will be able to:

CO	Description
CO1	Sources of energy and energy production in relation to heating, ventilating and air conditioning.
CO2	Understand the role of elements related to quality of energy utilization.
CO3	Apply the concepts underlying energy management by adopting appropriate design methodology in providing energy related services.
CO4	Evaluate the Energy management of electrical equipment.
CO5	Understand the impacts of Energy in building design and Energy efficient and environment friendly building.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Fundamentals of Energy	7
2	Energy and Resource Conservation	11
3	Design Consideration	11
4	Energy in Building Design	10
5	Energy Management	9

B. DETAILED SYLLABUS

Unit	Unit Details
1	Fundamentals of Energy
	Fundamentals of energy-Energy Production Systems -Heating, Ventilating and Air conditioning -Solar Energy and Conservation -Energy Economic Analysis -Energy conservation and audits -Domestic energy consumption -savings- challenges-primary energy use In buildings -Residential, Commercial -Institutional and public, Buildings
2	Energy and Resource Conservation
	Energy and resource conservation, Design of green buildings -Evaluation tools for building energy -Embodied and operating energy .Peak demand-Comfort and indoor air quality -Visual and acoustical quality -Land, water and materials -Airborne emissions and waste management.
3	Design Consideration
	Natural building design consideration, Energy efficient design strategies -Contextual factor - Longevity and process Assessment -Renewable Energy Sources and design - advanced building Technologies, Smart buildings -Economics and cost analysis.
4	Energy in Building Design

	Energy in building design- Energy efficient and environment friendly building -Thermal phenomena.-thermal comfort- Indoor Air quality -Climate, sun and Solar radiation. Psychometrics -passive heating and cooling systems- Energy Analysis. Active HVACsystems - Preliminary Investigation -Goals and policies -Energy audit -Types of Energy audit -Analysis of results –Energy flow diagram -Energy consumption /Unit Production- identification of wastage -Priority of conservative measures -Maintenance of energy management programme.
5	Energy Management
	Energy management of electrical equipment- Improvement of power factor - Management of maximum demand -Energy savings in pumps -Fans.-compressed air systems -Energy savings In Lighting systems- Air conditioning systems- Applications- .Facility operation and maintenance- Facility modifications- Energy recovery dehumidifier- Waste heat recovery. Steam plants and distribution systems Improvement of boiler efficiencies-Frequency of blow down -Steam leakage-steam Flash and condensation

D. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1	“Environmental Control system	Moore F.	Latest	Mc Graw Hill, Inc
2	“Wind and Light: Architectural design strategies	Brown, GZ Sun	Latest	John Wiley,
3	“Energy Conversation in Building: A Guide to part of the building regulations	Waters J.R,	Latest	Black well publishing
Websites				

E. COs AND POs MAPPING

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

A. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	1	-	-
CO2	3	3	-	-	-
CO3	3	2	1	-	-
CO4	2	-	1	-	-
CO5	2	2	-	3	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To define and describe disaster, hazard, emergency, vulnerability, and risk and the importance of disaster management to handle the situation.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Estimate and assess the Disaster Management Cycles.
CO2	Understand the Disaster Community and planning
CO3	Identify various parameters that influences the performance of devices/processes
CO4	Understand the fundamentals of solar air heater based on heat transfer analysis and basics of concentrating collectors
CO5	Understand the basics of solar photovoltaic cell and PV cell configurations

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Objectives	8
2.	Disaster Management Cycle-I	6
3.	Disaster Management Cycle-II	6
4.	Disaster Community	8
5.	Disaster Planning	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	OBJECTIVES
	Objectives-Overview of Disaster Management – Distinguishing between an emergency and a Disaster situation. Disaster Management Cycle – Phase I: Mitigation, and strategies; hazard Identification and vulnerability analysis. Disaster Mitigation and Infrastructure, impact of disasters on development programmes, vulnerabilities caused by development, developing a draft country-level disaster and development policy.
2.	DISASTER MANAGEMENT CYCLE
	Phases-Disaster Management Cycle – Phase II: Preparedness, Disaster Risk Reduction(DRR), Emergency Operation Plan (EOP), Mainstreaming Child Protection and Gender in Emergency Planning, Assessment,.
3.	Disaster Management Cycle-II
	Disaster Management Cycle – Phases III and IV: Response and recovery, Response aims, Response Activities, Modern and traditional responses to disasters, Disaster Recovery, and Plan , Disasters as opportunities for development initiatives.
4.	Disaster Community
	Disaster Community-Community-based Initiatives in Disaster management, need for Community-Based Approach, categories of involved organizations: Government, Nongovernment organizations (NGOs), Regional And International Organizations, Panchayaths, Community Workers, National And Local Disaster Managers,

	Policy Makers, Grass-Roots Workers, Methods Of Dissemination Of Information, Community-Based Action Plan, Advantages/Disadvantages Of The CommunityBased Approach.
5.	Disaster Planning
	Disaster Planning-Disaster Response Personnel and duties, Community Mitigation Goals, Pre-Disaster Mitigation Plan, Personnel Training, Volunteer Assistance, School-based Programmes, Hazardous Materials, Ways of storing and safely handling hazardous materials, Coping with Exposure to Hazardous Materials

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Edition
1.	Disaster Management: Through the New Millennium	Ayaz	Latest	Anmol Publications.
2.	Emergency Medical Services and Disaster Management: A Holistic Approach	Dave, P. K	Latest	New Delhi: Jaypee Brothers Medical Publishers
3.	Disaster Management	Singh, R. B.	Latest	New Delhi: Rawat Publications

Websites:

<http://www.nptelvideos.in/2012/11/building-materials-and-construction.html>
https://nptel.ac.in/content/syllabus_pdf/105102088.pdf
<https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330>
<https://nptel.ac.in/courses/105102088/>

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	-	1	3
CO2	2	-	-	1	3
CO3	2	-	-	1	3
CO4	3	-	-	2	1
CO5	3	-	-	2	1

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To study the damages, repair and rehabilitation of structures.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	To study about Durability of Different Types of Buildings.
CO2	To know about the Phases of Maintenance
CO3	To study about the Techniques for Repair and Strengthening Measures
CO4	Analyze the Techniques for Repair-Surface Repair-Material Selection-Surface Preparation.
CO5	Understand the Importance of Strengthening Measures and Flexural Strengthening

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Durability	6
2.	Phases of Maintenance	6
3.	Materials for Repair	6
4.	Techniques for Repair	6
5.	Strengthening Measures	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	DURABILITY
	Durability: Life Expectancy of Different Types of Buildings –Influence of Environmental Elements Such as Heat, Moisture, Precipitation and Frost on Buildings- Design and Construction Errors, Corrosion Mechanism- Effect of Biological Agents like fungus, moss, plants, trees, algae, - Termite Control and Prevention - Chemical Attack on Building Materials and Components- Aspects of Fire and Fire Prevention on Buildings- Impact of Pollution on Buildings.
2.	PHASES OF MAINTENANCE
	Maintenance- Definitions, objectives, Phases of Maintenance, Repair and Rehabilitation- Common Defects In Buildings And Measures To Prevent And Control The Same- Building Failures – Causes And Effects- Cracks In Buildings -Preventive Measures Various Aspects- Inspection, Assessment Procedure For Evaluating Damaged Structure -Causes of Deterioration - Testing Techniques- Non Destructive Testing Methods.
3.	MATERIALS FOR REPAIR
	Materials-Materials For Repair - Special Mortar And Concretes, Concrete Chemicals, Special Cements And High Grade Concrete – Expansive Cement, Polymer Concrete, Sulphur Infiltrated Concrete, Ferro Cement, Fiber Reinforced Concrete-Admixtures Of Latest Origin

4.	TECHNIQUES FOR REPAIR
	Techniques for Repair- Surface Repair – Material Selection – Surface Preparation - Rust Eliminators And Polymers Coating For Rebars During Repair – Repair Of Cracks In Concrete And Masonry-Methods Of Repair - Epoxy Injection, Mortar Repair For Cracks -Guniting and Shotcreting -Waterproofing Of Concrete Roofs.
5.	STRENGTHENING MEASURES
	Strengthening Measures- Flexural Strengthening, Beam Shear Capacity Strengthening, Column Strengthening, Shoring, Under Pinning And Jacketing Demolition Of Buildings– Introduction – Planning, Precautions And Protective 36 SRM-M.Tech.-CEM (2015-16) Measures In Demolition Work-Sequence Of Operations- Demolition Of Structural Elements.

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publication/Edition
1.	Concrete Structures, Materials, Maintenance and Repair	Denison Campbell Allen and Harold Roper	Latest	Longman Scientific and Technical UK
2.	Repair of Concrete Structures	Allen .R.T and S. C .Edwards	Latest	Blakie and Sons, UK
3.	Concrete Technology	Santhakumar .A.R	Latest	Oxford University Press,
Websites				
http://www.nptelvideos.in/2012/11/engineering-geology.html https://nptel.ac.in/content/syllabus_pdf/105105106.pdf https://nptel.ac.in/courses/105105106/ https://nptel.ac.in/courses/105106055/ https://nptel.ac.in/content/syllabus_pdf/105106055.pdf https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	1	2	2
CO2	2	1	1	2	1
CO3	3	2	-	1	-
CO4	1	1	3	1	-
CO5	-	-	-	2	3

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

Department Elective-II

Code: MCMECV1105

Remote Sensing and GIS

3 Credits [LTP: 3-0-0]

COURSE OUTCOME

After completion of this course, student will be able to:

CO No.	Description
CO1	Infer the Indian remote sensing satellites and their platforms.
CO2	Present available GIS and Remote Sensing software like ARC GIS, QGIS and ERDAS Imagine
CO3	Develop the Digital Elevation Model (DEM).
CO4	Analyze the land use and land cover to develop NDVI and EVI.
CO5	Understand the Importance of GIS and Remote Sensing in Environmental Management

A. DETAILED SYLLABUS

Unit	Unit Details
1.	Basic concepts of Remote sensing
	Introduction to Remote Sensing, Electromagnetic Spectrum and radiation, Remote Sensing Platforms and Satellite Sensors
2.	Sensors and Scanning Systems in Remote Sensing
	Indian Remote Satellites (IRS), Spectral characteristics earth surface features i.e, vegetation, water and soil, Understanding the spectral curves to create spectral library. Digital Image processing of satellite data, Elements of photo / image interpretation , Concepts of digital image processing
3.	Image Classification
	Filters, Image registration, Feature extraction techniques, Image classification, Land use and land cover analysis.
4.	Basic concepts of GIS
	Introduction to GIS, History of development of GIS, Elements of GIS - Computer hardware and software, Map reading, various maps in GIS. Map overlay and Overlay operations
5.	Spatial Analysis tools
	Vector and Raster data model, Data storage and database management, Spatial data analysis techniques.

B. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Biomass – Thermo-chemical Characteristics.	PVR Iyer; T R Rao; P D Grover and N P Singh,,	Latest	Biomass gasifier Action Research Centre, Dept of Chemical Engineering , IIT Delhi
2.	Hand book of biomass down draft gasifier engine systems”	Reed, T. B. and Das, A	Latest	Solar Energy Research Institute, U.S. Dept. of Energy

Websites
https://nptel.ac.in/courses/120108005/
https://nptel.ac.in/courses/105/106/105106056/
https://nptel.ac.in/courses/105105160/

S. No	Important web links
1.	https://nptel.ac.in/courses/105/107/105107155/
2.	https://nptel.ac.in/courses/121/107/121107009/

COs AND POs MAPPING

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

COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	-	1
CO2	1	3	-	2	1
CO3	3	1	1	1	-
CO4	3	2	2	-	-
CO5	3	2	-	-	2

COURSE OVERVIEW AND OBJECTIVES:

To develop analytical capability and to impart knowledge in statistical methods and Queuing theory and their applications in Engineering and Technology and to apply these concepts in engineering problems they would come across.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Assess the Theoretical Distributions.
CO2	Understand the basics of the Regression Methods
CO3	Identify various parameters by Testing of Hypothesis
CO4	Study the basics of ANOVA and Design of Experiments.
CO5	Examine the Queuing Theory.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Theoretical Distributions	6
2.	Regression Methods	8
3.	Testing of Hypothesis	8
4.	ANOVA And Design of Experiments	6
5.	Queuing Theory	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Theoretical Distributions
	Binomial, Poisson and Normal distributions - Definitions, Simple problems only (Derivations not included).
2.	Regression Methods
	Principle of Least Squares, Fitting of straight line and parabola - Correlation - Karl Pearson's coefficient of correlation and Spearman's rank correlation - Linear regression.
3.	Testing of Hypothesis
	Sampling Distributions - Tests based on Normal, t, Chi-Square and F-Distributions.
4.	ANOVA And Design of Experiments
	One way and Two way classification of ANOVA - Completely Randomized Design - Randomised Block Design - Latin square Design.

5.	Queuing Theory
	Single and multiple server Markovian queuing models - M/M/1 and M/M/c queuing models and Applications (Derivations not included).

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1.	Fundamentals of mathematical statistics,	Gupta, S.C., and Kapoor, V.K	Latest	Sultan Chand and sons,
2.	Fundamentals of Applied statistics,	Gupta, S.C., and Kapoor, V.K	Latest	Sultan Chand and sons
3.	Probability Statistics and Random processes,	Veerarajan.T	Latest	TMH, First reprint,
Websites				
https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf				
http://www.nptelvideos.in/2012/11/building-materials-and-construction.html				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	2	2	-
CO2	2	-	1	3	1
CO3	1	-	3	1	-
CO4	2	-	3	-	-
CO5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

This course will enable students to understand the various types of equipment's used for Construction. Understand the various methods of Construction Techniques.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	To decide which type and capacity of construction equipment can be used for a particular job on site
CO2	Analyse the Mechanization in aggregate manufacturing
CO3	Examine the Mechanization in rebar fabrication.
CO4	Examine the Mechanization through construction methods/technologies.
CO5	To Know the methods of drilling and blasting

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Introduction to mechanization	6
2	Mechanization in aggregate manufacturing	8
3	Mechanization in rebar fabrication	8
4	Mechanization through construction methods/technologies	6
5	Mechanization through construction methods	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction to mechanization
	Introduction to mechanization: Definition, advantages and limitations of mechanization, Indian scenario and Global scenario. Mechanization through construction equipment: Equipment cost, Machine Power, Production cycle - Dozers, scrapers, Excavators, Finishing equipment, Trucks and Hauling equipment, Hoisting equipment, Draglines and Clamshells
2	Mechanization in aggregate manufacturing
	Mechanization in aggregate manufacturing: Natural aggregates and recycled aggregates
3	Mechanization in rebar fabrication
	Mechanization in rebar fabrication Mechanization in concrete production and placement Mechanization through construction: formwork and scaffolding types, materials and design principles
4	Mechanization through construction methods/technologies
	Mechanization through construction methods/technologies: segmental construction of

	bridges/flyovers, box pushing technology for tunneling, trench-less technology. Pile Driving Equipment : Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact
5	Mechanization through construction methods
	Mechanization through construction methods of Drilling, Blasting and Tunneling Equipment : Definition of terms, bits, Jackhammers, Drifters, wagon drills, chisel drills piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern. Safety and Environmental issues in mechanization

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publisher
1	Construction Equipment and its Planning and Applications	Mahesh Varma	Latest	Metropolitan Book Co.(P) Ltd.,New Delhi. India
2	Construction Equipment and Management	Sharma S.C.	Latest	, Khanna Publishers
3	Construction Equipment	James F Russell	Latest	Prentice Hall
Websites				
https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf				
http://www.nptelvideos.in/2012/11/building-materials-and-construction.html				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	2	2	-
CO2	2	-	1	3	1
CO3	1	-	3	1	-
CO4	2	-	3	-	-
CO5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To enable essential and practical understanding of the basic energy requirements in buildings for different applications
 2. To understand the external and internal energy processes which control the built environment
 4. To study emerging technologies in building energy management.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Understand the various Construction Costing.
CO2	Infer the knowledge on using proper Cash flow
CO3	Understand the interaction of various Cash and payment of works.
CO4	Analyze of proper methodology for Material Management.
CO5	Analyze the Financial Management.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Construction Costing	6
2	Cash flow	8
3	Cash and payment of works	8
4	Material Management	6
5	Financial Management	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Construction Costing
	Construction Costing: Costing of construction Works; different methods of costing, cost elements in a projects; analysis of rates; non-scheduled items of work; cost estimation for a small construction job; purpose, methods and stages of cost control; cost monitoring; cost forecasting methods; variations in individual items of work and their effect on total contract price; valuation of variations. Methods of measurement of earthwork ,RCC , Brickwork, Woodwork joinery, steel and iron work plastering/ painting and white/colour washing & painting
2	Cash flow
	Cash flow: Determining the funds required for a construction job; preparing cash flow statements; cash inflow and outflow during contract period; project expectations.
3	Cash and payment of works

	Cash and payment of works; Precautions in custody of cash, imprest account and temporary advance; maintenance of temporary advance; and advance account; different types of payment, first, running, advance and final payments.
4	Material Management
	Material Management: Objectives and scope of material management classification, codification, ABC analysis, standardization and substitution; introduction to inventory control; stores management; organization and lay out; receipt, inspection and issue; care and safety; store records and store accounting.
5	Financial Management
	Financial Management: Meaning and scope financial statement analysis, funds flow analysis, Capital budgeting, cost benefit analysis.

C. RECOMMENDED STUDY MATERIAL:

No	Reference Book	Author	Edition	Publisher
1	Integrated cost and schedule control for construction projects.	Mueller, F.W	Latest	by CRC Press,
Websites				
https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf				
http://www.nptelvideos.in/2012/11/building-materials-and-construction.html				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	2	2	-
CO2	2	-	1	3	1
CO3	1	-	3	1	-
CO4	2	-	3	-	-
CO5	2	-	1	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Analyze the impact of sustainable design strategies on local building regulations.	L4
CO – 02	Evaluate the effectiveness of tree preservation measures in site selection.	L4
CO – 03	Apply water metering systems and irrigation management techniques.	L3
CO – 04	Understand the integration of renewable energy sources in building design.	L2
CO – 05	Remember sustainable building materials and waste management practices.	L1

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Sustainable Architecture and Design	8
2	Site Selection and Planning	9
3	Water Conservation	8
4	Energy Efficiency	8
5	Building Materials and Resources	9

B. DETAILED SYLLABUS

Unit	Unit Details
1	Sustainable Architecture and Design
	Approaches to Integrated Design, Preservation of Site Environment, Passive Design Strategies, Compliance with Local Building Regulations, Provision of Basic Amenities, Accessibility to Public Transportation.
2	Site Selection and Planning
	Use of Low-emitting Vehicles, Consideration of Natural Topography and Vegetation, Tree Preservation or Transplantation Measures, Strategies for Heat Island Reduction (Roof and Non-roof), Outdoor Light Pollution Reduction Techniques, Universal Design Principles, Provision of Basic Facilities for Construction Workers.
3	Water Conservation
	Implementation of Rainwater Harvesting (Roof & Non-roof), Adoption of Water-Efficient Plumbing Fixtures, Sustainable Landscape Design Practices, Management of Irrigation Systems, Waste Water Treatment and Reuse Strategies, Installation of Water Metering Systems.
4	Energy Efficiency
	Use of Eco-friendly Refrigerants, Enhancement of Energy Efficiency Measures, Integration of On-site and Off-site Renewable Energy Sources, Implementation of Energy Metering and Management Systems

5	Building Materials and Resources
	Segregation and Management of Waste Materials, Utilization of Sustainable Building Materials Organic Waste Management Practices, Proper Handling of Waste During Construction, Incorporation of Certified Green Building Materials, Post-occupancy Assessment and Management of resources.

A. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Introduction to Green Buildings & Built Environment	IGBC	2022	BS Publications / BSP Books
2	Green Building Guidance: The Ultimate Guide for IGBC Accredited Professional Examination	Karthik Karuppu; NVICO	2019	Repro Books-On-Demand

B. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	3	3	2	1	3	3	1	-	2	-	1
CO – 02	1	2	3	2	-	3	3	2	-	-	-	1
CO – 03	2	2	3	3	3	1	3	1	-	-	-	1
CO – 04	2	2	3	2	3	3	3	1	-	-	-	1
CO – 05	1	1	2	1	2	1	3	1	-	1	-	1

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / SkillDevelopment

COURSE OVERVIEW AND OBJECTIVES

To familiarize students with basic of research and the research process. To enable the students in conducting research work and formulating research synopsis and report. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling

COURSE OUTCOME

The student will be able to:

CO1 To be able to distinguish a purpose statement, a research question or hypothesis, and a research objective.

CO2 To be able to define the meaning of a variable, and to be able to identify independent, dependent, and mediating variables

CO3 To be able to distinguish between categorical and continuous measures

CO4 To be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses

CO5 To understand the link between quantitative research questions and data collection and how research questions are operationalized in educational practice.

A. OUTLINE OF COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	General	9
2.	Connections	10
3.	Towers	8
4.	Plastic Analysis	9
5.	Industrial Building	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Overview of Research Methodology Introduction, Mathematical tools for analysis, Research problems in management, Types of research, Research Process, Data Collection & Presentation: Introduction, Primary data, Secondary data, Data Presentation
2.	Review of Basic Statistical Measures & Basic Multivariate Analysis Introduction, Measures of Central Tendencies, Measures of Variation, Measures of Skewness. Basic Multivariate Analysis: Introduction, Correlation analysis, Forecasting, Linear regression & Timeseries
3.	Design and Analysis of Experiments Introduction, Analysis of Variance, Completely Randomized design, Randomized complete block design, Latin square design, Duncan's multiple Range Test, Functional design, second factorial experiment, Expected Mean Square.
4.	Algorithmic Research & Simulation Introduction, Algorithmic Research Problems, Types, Types of Solution Procedures, Steps of development, Steps of Algorithmic Research, Design of Experiments, Meta Heuristics for Combinational Problems Simulation: Introduction, Need for simulation, Types, Simulation Languages, case study.
5.	Report Writing and Presentation Introduction, Types of report, Guidelines for review draft, Report format, Typing Instructions, Oral Presentations

C. RECOMMENDED STUDYMATERIAL:

S. No	Title of the Book	Author
1.	Research Methodology	R. Panneerselvam, PHI
2.	Research Methodology: Methods and Trends	Dr. C. R. Kothari
3.	Research Methodology: A Step by Step Guide for Beginners	Ranjit Kumar
Important Web Links		
1.	https://libguides.wits.ac.za/c.php?g=693518&p=4914913	
2.	https://www.scribbr.com/dissertation/methodology/	
3.	https://www.open.edu/openlearn/money-management/understanding-different-research-perspectives/content-section-8	
4.	https://www.researchgate.net/publication/270956555_CHAPTER_3_-_RESEARCH_METHODODOLOGY_Data_collection_method_and_Research_tools	
5.	https://www.youtube.com/watch?v=ze5bS-DNERk	

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	-	1
CO2	2	-	3	2	-
CO3	1	-	3	1	2
CO4	-	2	2	-	3
CO5	2	1	-	3	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development.

COURSE OUTCOME

CO1: To present themselves in an effective manner and know about their short-term and long-term goals.

CO2 To works in a team by managing time properly and focus on personal grooming, etiquettes and body language.

CO3 To demonstrate their abilities by improving skills of LSRW (Listening Speaking/Reading/Writing).

CO4 To present different viewpoints or ways of thinking about a situation, expand their abilities to resolve situations and get experience within the given context

CO5: To enhance their employability skills by working on the presentation of Résumé and giving impactful performance during Group Discussion.

A. DETAILED SYLLABUS

1.	Self-Introduction & knowing your environment
2.	Goal Setting & Planning
3.	Etiquettes (Personal, Social, Professional & Corporate) etiquettes
4.	Personal Grooming and Body language
5.	Time Management & Team Work
6.	Negotiation and conflict management
7.	Oral Communication & Writing Skills: Extempore & Paper Presentations.
8.	Resume Writing
9.	Group Discussion
10.	Interview Skills

A. SYLLABUS

Unit	Contents
	<p>Students will be grouped in two to three, will have to decide final thesis area, download research papers from IEEE, ACM, Elsevier, Springer etc. Summarizing paper – Reading abstracts and finding ideas, conclusion, Advantages of Their approach, and the drawbacks of the papers. Generalize results from a research paper to related research problems. Comparing the approach - Identify weaknesses and strengths in recent research articles in the subject. Practice sessions on how to read, analyze and summarize research papers. Students in group will have to deliver seminar, prepare a report and a review paper based on analysis.</p>

POORNIMA UNIVERSITY, JAIPUR									
Faculty of Engineering and Technology									
Name of Program:	M.Tech. in Construction Technology and Management Duration: 2 Years Total Credits: 81								
Teaching Scheme for Batch 2025-27									
Semester-II									
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	Theory								
MCMCCV2101	Quality Control and Assurance in Construction	3	-	-		40	60	100	3
MCMCCV2102	Construction Equipment and Management	3	-	-		40	60	100	3
MCMCCV2103	Environmental Engineering & Management	3	-	-		40	60	100	3
A.2	Practical								
MCMCCV2201	Project Management Lab - II	-	-	2		60	40	100	1
B.		Minor Stream Courses/ Department Electives I and II							
B.1	Theory								
MCMECV2101	Economics and Finance Management in Construction.	3	-	-	-	40	60	100	3
MCMECV2102	Building Maintenance			-	-	40	60	100	
MCMECV2103	Rural Construction Technology			-	-	40	60	100	
MCMECV2104	System Integration in Construction								
MCMECV2105	Infrastructure Development	3	-	-	-	40	60	100	3
MCMECV2106	Construction Safety			-	-	40	60	100	
MCMECV2107	Project Risk Analysis and Mitigation Techniques			-	-	40	60	100	
MCMECV2108	Management and Project Planning in Construction								
B.2	Practical								
	-	-	-	-	-	-	-	-	-
C		Multidisciplinary Courses							
MTEEMC2121	MOOC Course - I	3	-	-	-	-	-	-	3
D		Ability Enhancement Courses (AEC)							
MUACHM2207	Communication Skill - II	-	-	2		60	40	100	1
E		Skill Enhancement Courses (SEC)							
MULCSE2201	Skill Enhancement Technical Course-II			4		60	40	100	2
MULCCV2202	Review/Research Paper-I			2		60	40	100	1
F		Value Added Courses (VAC)							
	-	-	-	-	-	-	-	-	-
G		Summer Internship / Research Project / Dissertation							

MCMECCV2401	Seminar-II	-	-	2	-	60	40	100	1	
Total		18	0	12					24	
Total Teaching Hours		30								

PO's and PSO's are as follows

PO No.	PO's
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that MCMt the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. Considerations.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO No.	PSO's
1	A civil engineering graduate is efficient in fundamentals of civil engineering, mathematical & scientific reasoning and are able to plan, design the building structure, roads, sewage and water supply networks & other component of infrastructure system considering environmental, safety & health aspects.
2	A civil engineer is able to use modern tools, techniques, software's to solve complex engineering problems
3	A civil Engineer able to prepare BOQ & cost estimation & able to execute the projects in lined with set project goals.
4	A civil engineer is able to compile detailed project report & give technical specifications to provide required quality of work.
5	A civil engineer is able to access the quality of material used for construction & able to find out deviations & able to suggest preventative and corrective measures for sustainable development.

Major Core Courses

Code: MCMCCV2101	Quality Control and Assurance in Construction	3 Credits [LTP: 3-0-0]
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COURSE OVERVIEW AND OBJECTIVES:

To study the concepts of quality assurance and control techniques in construction. • To study of the design philosophy, design of special elements, flat slabs and yield line-based design, and ductile detailing.

COURSE OUTCOMES:

After completion of the course, student will be able to:

CO	Description
CO1	Analyze the quality control aspects in planning, systems, and management, assurance and Improvement techniques.
CO2	Analyze of various type of Quality Systems.
CO3	Examine the various Quality Planning
CO4	Computation of various types of Quality Assurance and Control.
CO5	Demonstrate the Quality Improvement Techniques.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Quality Management	8
2	Quality Systems	6
3	Quality Planning	8
4	Quality Assurance and Control	6
5	Quality Improvement Techniques	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Quality Management
	Introduction–Definitions and objectives–Factors influencing construction quality– Responsibilities and authority– Quality plan– Quality Management Guidelines–Quality circles
2	Quality Systems
	Introduction-Quality system standard– ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.
3	Quality Planning
	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.
4	Quality Assurance and Control
	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.
5	Quality Improvement Techniques
	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.

B. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Construction Inspection Handbook- Total Quality Management	James, J.O' Brian	Latest	Van Nostrand
Websites				
https://www.bdcnetwork.com/building-types https://en.wikipedia.org/wiki/Building_design https://nptel.ac.in/courses/105106177/				

C. COs AND POs MAPPING

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

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	-
CO2	3	-	-	2	-
CO3	3	-	-	2	-
CO4	3	-	-	2	1
CO5	3	1	-	-	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To study the finer aspects of planning, scheduling and controlling of construction projects

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	To study the elements of construction planning and scheduling and to apply appropriate tools and techniques like networks and coding systems.
CO2	To study the monitoring of projects through cost control.
CO3	To study the elements of quality control and safety of construction projects.
CO4	Analyze the concept of gathering and using project information
CO5	Understand the standard methodologies for PROJECT INFORMATION.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Basic Concepts in Construction Plans	10
2.	Construction Schedules	8
3.	Introduction to Project Budget	7
4.	Quality and Safety Management	5
5.	Project Information	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Basic Concepts in Construction Plans
	<p>Introduction:</p> <p>Construction economy; Factors affecting the selection of construction equipment; rolling resistance, effect of grade on required tractive effort, effect of altitude and temperature on the performance of internal combustion engines, drawbar pull, rimpull and acceleration, owning and operating cost of equipment.</p> <p>Earth Moving Equipment :</p> <p>Crawler and wheel tractors-their functions, types and specifications; grade-ability, bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers; earth loaders; placing and compacting earth fills.</p> <p>Power shovels - functions, selection, sizes, shovel dimensions and clearances, output, Draglines – functions types ,sizes ,output, Clamshells; Safe lifting capacities and working ranges of cranes; Hoes ,trenching machines, types and production rates calculation of</p>

	production rates of equipment; examples.
2.	Construction Schedules
	<p>Hauling Equipment: Trucks; capacities of trucks, balancing the capacities of hauling units with the size of excavator; effect of grade and rolling resistance on the cost/performance of hauling equipment.</p> <p>Compaction Equipment: Roller class: sheep's foot rollers, pneumatic tyre rollers, steel wheel rollers, vibrating rollers, grid type rollers-their applications.</p>
3.	Introduction to Project Budget
	<p>Drilling, Blasting and Tunneling Equipment: Definition of terms ,bits, jackhammers, drifters, wagon drills, churn drills, piston drills, blast hole drills, shot drills, diamond drills; Tunneling equipment; selecting the drilling method and equipment; selecting drilling pattern; rates for drilling rock, air compressors.</p>
4.	Quality and Safety Management
	<p>Piling Equipment: Pile hammers, selecting a pile hammer loss of energy due to impact, energy losses due to causes other than impact. Equipment for bored and cast in-situ piles</p> <p>Pumping Equipment: Pumping equipment in construction, Classification of pumps; Selection of pumps –Air-operated centrifugal type sump pumps; performance of centrifugal pumps; well point system.</p>
5.	Project Information
	Economic Considerations in the procurement and use of construction equipment; Time value of money; ROR and IROR analysis; depreciation; costing of construction equipment operation;

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Construction equipment and its planning and applications	Verma, Mahesh	Latest	Metropolition Book Co. Ltd.
2.	Construction Equipment and its management	Sharma SC	Latest	Khanna Publishers
Websites:				
http://www.nptelvideos.in/2012/11/surveying.html				
https://nptel.ac.in/courses/105107122/				
https://nptel.ac.in/courses/105108077/				
https://nptel.ac.in/courses/105102015/				

D. COs AND POs MAPPING

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

E. COs AND POs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	-	2	-
CO2	1	3	-	2	-
CO3	1	3	-	2	-
CO4	1	3	-	2	-
CO5	1	3	-	2	-

Note: On the basis of mapping of COs with POs, this course is related to Entrepreneur

COURSE OVERVIEW AND OBJECTIVES:

To study the finer aspects of Environmental engineering management

A. COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Understand the environmental impacts associated with construction activities and the need for sustainable construction practices.
CO2	Analyze sources of pollution and construction waste, and propose suitable management and control measures.
CO3	Apply relevant environmental laws, regulations, and standards in construction project planning and execution.
CO4	Evaluate and prepare Environmental Impact Assessment (EIA) reports and Environmental Management Plans (EMP) for construction projects.
CO5	Incorporate green building concepts, life cycle analysis, and environmental management systems in sustainable project planning and design.

B. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Environmental Challenges in Construction Projects	10
2.	Construction Waste Management & Pollution Control Techniques	8
3.	Environmental Laws, Regulations, and Compliance for Construction	7
4.	Environmental Impact Assessment (EIA) and Management Plans	5
5.	Sustainable Construction & Green Building Practices	6

C. DETAILED SYLLABUS

Unit	Unit Details
1.	Environmental Challenges in Construction Projects
	Introduction to environmental engineering in the context of construction, Sources and types of environmental impacts from construction activities, Land degradation, Air, water, and noise pollution, Disruption of natural drainage and ecosystems, Environmental consequences of site development, excavation, and heavy machinery use, Concept of sustainable construction and eco-efficiency, Environmental performance indicators in construction projects,
2.	Construction Waste Management & Pollution Control Techniques

	Generation and classification of construction and demolition (C&D) waste, Sources: concrete, bricks, tiles, wood, plastics, metals, packaging, hazardous materials, Solid waste management hierarchy: Reduce, Reuse, Recycle, Recover, Dispose, Site-level waste reduction strategies and material optimization, Air pollution: sources on construction sites, particulate emissions, fugitive dust, Water pollution from site runoff, cement wash, and temporary sanitation systems
3.	Environmental Laws, Regulations, and Compliance for Construction
	National Environmental Policy and its relevance to construction, Environment (Protection) Act, 1986, Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Construction and Demolition Waste Management Rules, 2016, E-Waste and Hazardous Waste Management Rules (if applicable), Environmental clearance process for infrastructure and real estate projects, Roles of CPCB, SPCB, SEIAA, MoEFCC in construction-related approvals.
4.	Environmental Impact Assessment (EIA) and Management Plans
	Need and scope of EIA in construction and infrastructure projects, EIA process: Screening, Scoping, Baseline data collection, Prediction and evaluation of impacts, Mitigation and monitoring, Public consultation, Tools and techniques used in EIA: matrices, overlays, GIS, checklists, Preparation of Environmental Management Plan (EMP), Environmental monitoring and audit, Case studies: EIA of metro rail, highway, residential complex, industrial park.
5.	Sustainable Construction & Green Building Practices
	Concept of sustainable development in construction, Introduction to green building concepts and rating systems: IGBC, GRIHA, LEED, Energy efficiency and resource conservation in buildings, Life Cycle Assessment (LCA) for building materials and construction processes, Environmental cost-benefit analysis, Use of sustainable materials: fly ash, slag, recycled aggregates, low-emission materials, Implementation of ISO 14001 Environmental Management System in construction firms.

D. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Environmental Management in Construction	Christopher Gorse, David Highfield	Latest	Palgrave Macmillan
2.	Environmental Impact Assessment	Larry W. Canter	Latest	McGraw-Hill Education
Websites:				
https://nptel.ac.in/courses/103107084				
https://archive.nptel.ac.in/courses/120/108/120108004				
https://archive.nptel.ac.in/courses/127/105/127105018				
https://nptel.ac.in/courses/103107215				

A. COs AND POs MAPPING

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

B. COs AND POs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	-	2	-
CO2	1	3	-	2	-
CO3	1	3	-	2	-
CO4	1	3	-	2	-
CO5	1	3	-	2	-

Note: On the basis of mapping of COs with POs, this course is related to Entrepreneur

Code: MCMCCV2201

Project Management Lab-II

1 Credits [LTP: 0-0-2]

A. DETAILED SYLLABUS**List of Experiments**

Design as per syllabus of theory

Department Elective-I

Code: MCMECV2101 Economics and Finance Management in Construction 3 Credits [LTP: 3-0-0]

COURSE OVERVIEW AND OBJECTIVES:

To study the concepts of Construction Economic and Finance such as comparing alternatives proposals, evaluating alternative investments, management of funds, and management of accounting.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Know the concepts in economics and finance in constructions
CO2	Evaluate the comparing Alternatives Proposals
CO3	Evaluating Alternative Investments.
CO4	Analyze the Funds Management
CO5	Analyze of Fundamentals of Management Accounting.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Basic Principles	8
2.	Comparing Alternatives Proposals	8
3.	Evaluating Alternative Investments	6
4.	Funds Management	6
5.	Fundamentals of Management Accounting	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Basic Principles
	Time Value of Money – Cash Flow diagram – Nominal and effective interest- continuous interest. Single Payment Compound Amount Factor (P/F,F/P) – Uniform series of Payments (F/A,A/F,F/P,A/P)– Problem time zero (PTZ)- equation time zero (ETZ). Constant increment to periodic payments – Arithmetic Gradient(G), Geometric Gradient (C).
2.	Comparing Alternatives Proposals
	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.
3.	Evaluating Alternative Investments
	Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax before and after depreciation – Value Added Tax (VAT) – Inflation
4.	Funds Management
	Project Finance, Sources of finance, Long-term and short-term finance, Working Capital Management, Inventory valuation, Mortgage Financing - International financial management, foreign currency management.

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

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	
1.	Engineering Economy	Blank, L.T., and Tarquin,A.J	22nd edition (2017)	Mc-Graw Hill Book Co.
2.	Engineering Economics & Cost Analysis	Collier C and GlaGola C	Latest	Addison Wesley Education Publishers
3.	Engineering Economic principles	Steiner, H.M	Tenth edition (2018)	Mc-Graw Hill Book

Websites
https://nptel.ac.in/courses/105103096/
https://nptel.ac.in/courses/105103021/
https://nptel.ac.in/courses/112105182/
https://nptel.ac.in/courses/112104117/
https://nptel.ac.in/courses/112/105/112105206/

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	2	3	-	1
CO2	3	1	-	2	-
CO3	1	3	-	1	1
CO4	2	-	1	-	3
CO5	3	2	1	-	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To study about the Understand the significance of Principles of maintenance.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Understand the significance of Principles of maintenance
CO2	Analyze of Design and economic consideration in Maintenance.
CO3	Evaluate of Maintenance Management
CO4	Evaluate of Materials for maintenance
CO5	Analyze of Investigation and diagnosis for Repair of structures

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Principles of maintenance	9
2.	Design and economic consideration in Maintenance	10
3.	Maintenance Management:	9
4.	Materials for maintenance	12
5.	Investigation and diagnosis for Repair of structures	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Principles of Maintenance
	Principles of Maintenance: Importance of Maintenance, Deterioration and durability, Factors affecting decision to carryout maintenance, Maintenance and GNP Agencies causing deterioration, effect of deterioration agencies on materials.
2.	Design and economic consideration in Maintenance:
	Design and economic consideration in Maintenance: Factors to reduce maintenance at design stage, Consideration of maintenance aspects in preparing tender document and specifications, Sources of error in design which enhances maintenance, Importance of working drawings and schedules Provision of access for maintenance and its importance at design stage. Economic consideration in maintenance: physical life, functional life, economic life of different types of buildings, discounting technique for assessment of economic life.
3.	Maintenance Management
	Maintenance Management: Definition, organization structure, work force for maintenance, communication needs, building inspections, maintenance budget and estimates, property inspections and reports, specification for maintenance jobs, health and safety in maintenance, quality in maintenance, maintenance manual and their importance.

4.	Materials for maintenance
	Materials for maintenance: Compatibility of repair materials, Durability and maintenance. Types of materials, their specification and application, Criteria for selection of material, Use of Commercial available materials in maintenance.
5.	Investigation and diagnosis for Repair of structures
	Investigation and Diagnosis for Repair of Structures: Basic approach to investigations, physical inspection, material tests, non-destructive testing for diagnosis, estimation of actual loads and environmental effects, study of design and construction practices used in original construction, retrospective analysis and repair steps. Maintenance Problems and Root Causes: Classification of defects, need for diagnosis, type of defects in building elements and building materials defect location, symptoms and causes.

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publisher
1.	Microbial Ecology Book	Larry L. Barton, Diana E. Northup	Latest	Wiley, Blackwell
2.	Ecology of Fresh Waters - A View for the Twenty-First Century Book	Brian Moss	Latest	Wiley, Blackwell
Websites				
https://nptel.ac.in/content/syllabus_pdf/105105166.pdf				
https://nptel.ac.in/courses/105105166/				
https://nptel.ac.in/courses/105101085/				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	3	-	-
CO2	1	3	-	1	1
CO3	2	-	3	-	-
CO4	2	3	-	1	-
CO5	-	-	-	2	3

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OVERVIEW AND OBJECTIVES:

This is the course work which gives the knowledge of Rural Development Planning and Concept of Appropriate Technology.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Evaluate of Rural Development
CO2	Analyze Rural Housing
CO3	Evaluate the Water Supply and Rural Sanitation
CO4	Analyze of Low Cost Roads and Transport.
CO5	Analyze the Low Cost irrigation.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Rural Development	8
2	Rural Housing	6
3	Water Supply and Rural Sanitation	8
4	Low Cost Roads and Transport	6
5	Low Cost irrigation	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Rural Development
	Rural Development Planning and Concept of Appropriate Technology: Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development programme/ projects.
2.	Rural Housing
	Rural Housing: Low cost construction materials for housing; Architectural considerations for individual and group housing; Composite material - ferro-cement & fly ash, autoclaved calcium silicate bricks and soil-stabilized un-burnt brick; Plinth protection of mud walls; design consideration and construction of: non-erodable mud plaster, Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry; rat-trap bond for walls; Panels for roof, ferro-cement flooring / roofing units, Thin R.C. ribbed slab for floors & roofs, pre-cast R.C. channel, Unit for flooring/roofing scheme, pre-cast R.C. flooring/ roofing scheme-Pan roofing scheme; manual & power scaffold hoist, lifting device for prefab components; Earthquake resistant measures for low cost houses.

3.	Water Supply and Rural Sanitation
	Water Supply and Rural Sanitation: Sources of water. BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; basic design principles of treatment-low cost water treatment technologies; Hand pumps-types, installation operation, and maintenance of Mark-II hand pumps; conservation of water; rainwater harvesting; drainage in rural areas, design of low cost waste disposal systems; design and construction of low cost latrines: 2 pit pour flush water seal, VIP latrines, septic tank etc; Biogas technology; low cost community & individual Garbage disposal systems, Ferro-cement water storage tanks.
4.	Low Cost Roads and Transport
	Low Cost Roads and Transport: Broad categories of Pavement Layers, types of Granular Sub-Bases and Bases, Bituminous Construction, Surface Treatments for roads in rural areas. Detailed features and Quality Control of Modified Penetration Macadam, Soil Stabilization, Lime, Lime-Flyash and Cement Treated Course. Crusher-run-Macadam. Use of local materials. Flexible Pavement: Design factors, Basic Principles, Guidelines for Surfacing for Rural Road. CBR method for Design of Flexible Pavement. PMGSY – highlights of Scheme.
5.	Low Cost irrigation
	Low Cost Irrigation: Design Consideration and construction of tube-well, drip & sprinkler irrigation systems. Watershed and catchments area development - problems and features of watershed management, watershed structures.

D.RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Editio	Publisher
1.	Apprority Technologies for low cost Housing.	A.G.Madhov Rao, D.S. Ramachandra Murthy	Latest	Oxford and IBH Pblishing Co. Pvt. Ltd
2.	Design of Minor Irrigation and Canal Structures	C.Satyanarayan Murthy	Latest	Wiley Eastern Ltd
Websites				
https://nptel.ac.in/courses/120108005/				
https://nptel.ac.in/courses/105/106/105106056/				
https://nptel.ac.in/courses/105105160/				

E. COs AND POs MAPPING

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

F. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		-	-	2
CO2	-	-	2	2	2
CO3	2		2	-	1
CO4	2		-	2	-
CO5	-		2	-	2

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To study and understand the construction system integration, environmental factors, services, maintenance and safety systems.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Analyze of Structural Integration.
CO2	Analyze of various Environmental Factors.
CO3	Analyze of Services.
CO4	Analyze of Maintenance.
CO5	Analyze the Safety.

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Structural Integration	8
2	Environmental Factors	6
3	Services	8
4	Maintenance	6
5	Safety	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Structural Integration
	Structural System, Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and Specification.
2.	Environmental Factors
	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.

3.	Services
	Plumbing – Electricity – Vertical circulation and their interaction – HVAC
4.	Maintenance
	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.
5.	Safety
	Ability of systems to protect fire – Preventive systems – fire escape system design – Planning for pollution free construction environmental – Hazard free Construction execution.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Handbook of Building Enclosure	A.J.Elder and Martiz Vinden Barg	Latest	McGraw-Hill Book Company
2.	Building Services Engineering	David V.Chadderton	Latest	Taylor and Francis
Websites				
https://nptel.ac.in/courses/120108005/				
https://nptel.ac.in/courses/105/106/105106056/				
https://nptel.ac.in/courses/105105160/				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		-	-	2
CO2	-	-	2	2	2
CO3	2		2	-	1
CO4	2		-	2	-
CO5	-		2	-	2

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

Department Elective-II

MCMECV2105	Infrastructure Development	3 Credits [LTP: 3-0-0]
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COURSE OVERVIEW AND OBJECTIVES:

This is the course work which gives the knowledge of Construction Industry, Status of Infrastructure in India, Public Private Partnership (PPP), Issues related to infrastructure development, Provisions made for Infrastructure Development.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Analyze of various Construction Industry
CO2	Analyze of various Status of Infrastructure in India
CO3	Analyze of Public Private Partnership (PPP).
CO4	Analyze of Issues related to infrastructure development
CO5	Analyze of Provisions made for Infrastructure Development

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Construction Industry	8
2	Status of Infrastructure in India	6
3	Public Private Partnership (PPP)	8
4	Issues related to infrastructure development	6
5	Provisions made for Infrastructure Development	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Construction Industry
	Nature, characteristics, size and structure. Role of infrastructure development in employment generation and improving of the National economy. Various Agencies associated with infrastructure development in India as regards various sectors.
2.	Status of Infrastructure in India
	Road sector Port , Railway, communication, water supply and drainage, Power sector, oil and gas industry, Health and educational services. Infrastructure Development, Indian budget and its relation with Infrastructure development projects in India. Various programs related with Infrastructure development in rural and urban sector
3.	Public Private Partnership (PPP)
	Public Private Partnership (PPP) in Infrastructure, Draft Concession Agreement for PPP projects, Escrow Agreement.
4.	Issues related to infrastructure development
	Issues related to infrastructure development – pre – requisites necessary to ensure success for switching over from public sector management to private sector management, issues in developing, funding and managing infrastructure projects, role, and responsibility of project

	management consultants. FDI in Infrastructure development, Problem areas and solutions.
5.	Provisions made for Infrastructure Development
	Provisions made for Infrastructure Development in the 12th and 13th five year plans of the planning commission Government of India. Formation of the Indian Infrastructure Development Corporation.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Construction Engineering & management of Projects (For Infrastructure & Civil Works).	S. C. Sharma	Latest	Khanna Publishers
2.	Public Private Partnership in Infrastructure	R. N. Joshi	Latest	Vision Publications
Websites				
https://nptel.ac.in/courses/120108005/				
https://nptel.ac.in/courses/105/106/105106056/				
https://nptel.ac.in/courses/105105160/				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		-	-	2
CO2	-	-	2	2	2
CO3	2		2	-	1
CO4	2		-	2	-
CO5	-		2	-	2

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

COURSE OVERVIEW AND OBJECTIVES:

This is the course work which gives the knowledge of safety parameter to be adopted during the construction.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	To identify the hazards and risks involved in construction industries
CO2	To improve safety culture within the organization
CO3	To reduce the workplace injuries through incident prevention methods
CO4	To use the modern tools to minimize the accident using monitoring methods, permits, exposure limits and ventilation
CO5	To apply the Effective Safety Management System at Construction Site

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Construction Safety Management	8
2	Safety in construction operations	6
3	Prevention of accidents	8
4	Safety equipment	6
5	Safety policies	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Construction Safety Management
	Construction Safety Management – Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring. Writing safety manuals, preparing safety checklists and inspection reports.
2.	Safety in construction operations
	Safety in construction operations – Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction
3.	Prevention of accidents
	Prevention of accidents. Safety measures. Safety in use of construction equipment e.g. vehicles, cranes, hoists and lifts etc. safety of scaffolding and working platforms. Safety while using electrical appliances. Explosives used
4.	Safety equipment
	Various safety equipment and gear used on site. First aid on site, Safety awareness

	program. Labor laws, legal requirement and cost aspects of accidents on site, Incentive for safety practices
5.	Safety policies
	Study of safety policies, methods, equipment, training provided on any ISO approved construction Company, safety in office, working on sites of high rise construction, deep excavation

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Construction Safety Handbook	Davies V.S.Thomasin K, Thomas Telford	Latest	London.
2.	Safety management	Girimaldi and Simonds	Latest	AITBS, New Delhi.
Websites				
https://nptel.ac.in/courses/120108005/				
https://nptel.ac.in/courses/105/106/105106056/				
https://nptel.ac.in/courses/105105160/				

E. COs AND POs MAPPING

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

F. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		-	-	2
CO2	-	-	2	2	2
CO3	2		2	-	1
CO4	2		-	2	-
CO5	-		2	-	2

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

COURSE OVERVIEW AND OBJECTIVES:

This is the course work which gives the knowledge of Risk analysis, identifying risk events, dealing with uncertainties, Use of risk prompts, Residual risk

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	To analyze the risk at site
CO2	Analyze of Identifying risk events
CO3	Evaluate of Dealing with uncertainties
CO4	Analyze of use of risk prompts
CO5	Evaluate of Residual risk

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Risk analysis	8
2	Identifying risk events	6
3	Dealing with uncertainties	8
4	Use of risk prompts	6
5	Residual risk	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Risk analysis
	General–Importance of Risk, types of risks, quantifiable and un-quantified risks. Micro,market, project level risk analysis approach. Risk analysis and Management for projects (RAMP).
2.	Identifying risk events
	Identifying risk events. Probability distribution. Stages in Investment, life-cycle; determination of NPV and its standard deviation for perfectly co-related, moderately co-related and un-correlated cash flows.
3.	Dealing with uncertainties
	Sensitivity analysis, scenario analysis simulation, decision tree analysis, risk profile method, certainly equivalent method; risk adjusted discount rate method, certainty index method, point estimated method.
4.	Use of risk prompts
	Use of risk prompts, use of Risk Assessment tables, details of RAMP process, utility of Grading of construction entities for reliable risk assessment. Risk Mitigation – by elimination, reducing, transferring, avoiding, absorbing or pooling

5.	Residual risk
	Residual risk, mitigation of un-quantified risk. Coverage of risk through CIDC's MOU with the Actuarial Society of India 60 through risk premium such as (BIP) – Bidding Indemnity Policy (DIMO) – Delay in meeting obligation by client policy, (SOC) – Settlement of claims policy (LOP)- Loss of profit policy (TI). Transit Insurance policy (LOPCE) Loss of performance of construction equipment policy.

D. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Project Risk Analysis and Management	John Bartlett	Latest	APM Publishing Limited

Websites

<https://nptel.ac.in/courses/120108005/> <https://nptel.ac.in/courses/105/106/105106056/>
<https://nptel.ac.in/courses/105105160/>

E. COs AND POs MAPPING

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

F. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		-	-	2
CO2	-	-	2	2	2
CO3	2		2	-	1
CO4	2		-	2	-
CO5	-		2	-	2

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

COURSE OVERVIEW AND OBJECTIVES:

To understand the concepts of Basics of Management, Project Management, Project Scheduling, Project Controlling, Construction site management.

COURSE OUTCOMES

After completion of the course, student will be able to:

CO	Description
CO1	Evaluate the Basics of Management
CO2	Understand the role of Project Management
CO3	Apply the mechanism of Project Scheduling
CO4	Analyze the project Controlling & Construction site management
CO5	Evaluate the work Study

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Basics of Management	8
2	Project Management	6
3	Project Scheduling	8
4	Project Controlling & Construction site management	6
5	Work Study	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Basics of Management
	Modern scientific management (Contribution by Fayol , F.W. Taylor , Mayo), Management Functions, Management Styles, SWOT Analysis in construction
2.	Project Management
	Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multistoried structures, ports, tunnels, Qualities, role and responsibilities of project manager, Role of Project Management Consultants, Enterprise Resource Planning (ERP)
3.	Project Scheduling
	Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, RPM (Repetitive Project Modeling) techniques. LOB technique, Mass haul diagrams. Precedence Network Analysis, software in Construction scheduling (MSP, primavera, Construction manager).
4.	Project Controlling & Construction site management
	Monitoring and Control, Crashing, Resource Leveling, Updating, Site mobilization – demobilization aspects, various Resources management based on funds availability, 10 coordinating, communicating & reporting Techniques, Application of MIS to construction,

	Training for Construction Managers, Engineers, Supervisors.
5.	Work Study
	a) Definition, Objectives, basic procedure, method study and work measurement, Work study applications in Civil Engineering. b) Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams. c) Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating. Activity sampling, time-lapse , photography technique, Analytical production studies.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Construction Planning & management	P S Gahlot & B M Dhir	Latest	Blackwell Science
2.	Construction Project planning & Scheduling	Charles Patrick	Latest	Pearson
Websites				
https://nptel.ac.in/courses/120108005/				
https://nptel.ac.in/courses/105/106/105106056/				
https://nptel.ac.in/courses/105105160/				

D. COs AND POs MAPPING

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

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		-	-	2
CO2	-	-	2	2	2
CO3	2		2	-	1
CO4	2		-	2	-
CO5	-		2	-	2

Note: On the basis of mapping of COs with POs, this course is related to Skill Development

COURSE OUTCOMES

Students will be able:

- CO1: To present themselves in an effective manner and know about their short-term and long-term goals.
- CO2 To works in a team by managing time properly and focus on personal grooming, etiquettesand body language.
- CO3 To demonstrate their abilities by improving skills of LSRW (Listening /Speaking/Reading/Writing).
- CO4 To present different viewpoints or ways of thinking about a situation , expand their abilitiesto resolve situations and get experience within the given context
- CO5 To enhance their employability skills by working on the presentation of Résumé and giving impactful performance during Group Discussion.

DETAILED SYLLABUS

Unit	Unit Details
1	Self-Awareness, Self Esteem & Confidence
2	The Corporate Fit-Dressing and Grooming, Etiquette: Social etiquette, business etiquette – civic sense – social norms
3	Effective Management Skills Time & Stress Management: Act in time on commitment
4	Personal Grooming and Body language
5	Time Management & Conflict Management
6	Planning & Prioritizing, Emotional Intelligence: Managing Emotions
7	Oral Communication & Writing Skills: Extempore & Paper Presentations.
8	Selling Self/Job Hunting Writing resume / Curriculum vitae
9	Mock GD – Goal setting - Career planning
10	Mock interview or Interview skills

A. COs AND POs MAPPING

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

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	-
CO2	3	-	-	2	-
CO3	3	-	-	2	-
CO4	3	-	-	2	1
CO5	3	1	-	-	1

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development.

A. COURSE OVERVIEW AND OBJECTIVES

To familiarize students with basic of research and the research process. To enable the students in conducting research work and formulating research synopsis and report. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling

COURSE OUTCOME

The student will be able to:

CO1 To be able to distinguish a purpose statement, a research question or hypothesis, and a research objective.

CO2 To be able to define the meaning of a variable, and to be able to identify independent, dependent, and mediating variables

CO3 To be able to distinguish between categorical and continuous measures

CO4 To be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses.

CO5 To understand the link between quantitative research questions and data collection and how research questions are operationalized in educational practice.

A. DETAILED SYLLABUS

Unit	Contents
1.	Foundations of Research
	Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory.
2.	Problem Identification & Formulation
	Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis
3.	Research Design
	Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses.
4.	Qualitative and Quantitative
	Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.
5.	Data Analysis
	Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis.
6.	Interpretation of Data and Paper Writing
	Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals.
7.	Use of Encyclopedias, Research Guides, Handbook
	Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline
8.	Use of tools / techniques for Research
	Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley,

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Research Methodology	R. Panneerselvam, PHI
2.	Research Methodology: Methods and Trends	Dr. C. R. Kothari
3.	Research Methodology: A Step by Step Guide for Beginners	Ranjit Kumar

A. DETAILED SYLLABUS

Unit	Contents
	<p>Students grouped in two to three during Semester I, will now continue to download further the research papers in the area, analyze, allocate individually, the set of papers,</p> <p>Literature survey Overview- What is literature survey, Functions of literature survey, maintaining a notebook, developing a Bibliography Methods of data collection – Observation, survey, contact methods, experimental, determining sample design Searching for publications – Publication databases, search engines and patent databases, Find some/all of the references for a given paper, including those that are not on the web Online tools-google, Cite Seer, ACM Digital Library, IEEE, The on-line Computer Science bibliography, Survey papers, Finding material not on the web, Searching patents.</p> <p>Publishing a paper How to write scientific paper Structure of a conference and journal paper, how (and How Not) to write a Good Systems Paper: Abstract writing, chapter writing, discussion, conclusion, references, bibliography, and In-class discussion of technical writing examples, Poster papers, review papers, how to organize thesis Project report, How to write a research proposal? How research is funded? Research ethics – Legal issues, copyright, and plagiarism General advice about writing technical papers in English Tips for writing correct English Practice sessions on above will be conducted. Students will have to deliver seminar, prepare a report and a review paper based on analysis individually.</p>

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
Name of Program:	M.Tech. in Construction Technology and Management				Duration: 2 Years				
		Total Credits: 81							
		<u>Teaching Scheme for Batch 2025-27</u>							
		Semester-III							
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	Theory								
A.2	Practical								
MCMCCV3401	Review/Research Paper-II	0	0	2		60	40	100	1
MCMCCV3402	Industrial Technical Seminar	0	0	4		60	40	100	2
B.		Minor Stream Courses/ Department Electives/ <u>Open Elective</u>							
B.1	Theory								
C		Multidisciplinary Courses							
MCMEMC3121 MSTEMC3121	MOOC Course - II	3	-	-	-	-	-	-	3
D		Ability Enhancement Courses (AEC)							
E		Skill Enhancement Courses (SEC)							
-	-	-	-	-	-	-	-	-	-
F		Value Added Courses (VAC)							
G		Summer Internship / Research Project / Dissertation							
MCMCCV3403	Internship	-	-	12	-	40	60	100	6
MCMCCV3404	Dissertation Part - I	-	-	12	-	60	40	100	6
Total		3	0	30					18
Total Teaching Hours		33							

PO's and PSO's are as follows

PO No.	PO's
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. Considerations.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO No.	PSO's
1	A civil engineering graduate is efficient in fundamentals of civil engineering, mathematical & scientific reasoning and are able to plan, design the building structure, roads, sewage and water supply networks & other component of infrastructure system considering environmental, safety & health aspects.
2	A civil engineer is able to use modern tools, techniques, software's to solve complex engineering problems
3	A civil Engineer able to prepare BOQ & cost estimation & able to execute the projects in lined with set project goals.
4	A civil engineer is able to compile detailed project report & give technical specifications to provide required quality of work.
5	A civil engineer is able to access the quality of material used for construction & able to find out deviations & able to suggest preventative and corrective measures for sustainable development.

M. Tech. Structural Engineering Syllabus-Third Semester

Code: MCMCCV3401

Review/Research Paper- II

1 Credits [LTP: 0-0-2]

A. COURSE OVERVIEW AND OBJECTIVES

To familiarize students with basic of research and the research process. To enable the students in conducting research work and formulating research synopsis and report. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling

COURSE OUTCOME

The student will be able to:

CO1 To be able to distinguish a purpose statement, a research question or hypothesis, and a research objective.

CO2 To be able to define the meaning of a variable, and to be able to identify independent, dependent, and mediating variables

CO3 To be able to distinguish between categorical and continuous measures

CO4 To be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses.

CO5 To understand the link between quantitative research questions and data collection and how research questions are operationalized in educational practice.

C. DETAILED SYLLABUS

Unit	Contents
1.	Foundations of Research
	Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable. Research Process
2.	Problem Identification & Formulation
	Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance
3.	Research Design
	Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.
4.	Qualitative and Quantitative
	Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.
5.	Data Analysis
	Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.
6.	Interpretation of Data and Paper Writing
	When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.
7.	Use of Encyclopedias, Research Guides, Handbook
	Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline
8.	Use of tools / techniques for Research
	Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

D. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Research Methodology	R. Panneerselvam, PHI
2.	Research Methodology: Methods and Trends	Dr. C. R. Kothari
3.	Research Methodology: A Step by Step Guide for Beginners	Ranjit Kumar

A. DETAILED SYLLABUS

Unit	Contents
	<ol style="list-style-type: none">1. For the seminar every student will individually study a topic assigned to him/her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.2. Selection of topic should be done by students in consultation with the concerned guide<ol style="list-style-type: none">a). The topic should be related to the branch but it should be an extended part of the branch (latest and advanced topic).b). The topic should be such that the student can gain the latest knowledge. Students should preferably refer to at least one research paper3. Seminar topics should not be repeated in the department and registration of the same should be done on a first come first served basis.4. Seminar report should be submitted in paper-bound copy prepared with computer typing<ol style="list-style-type: none">a). The size of the report depends on the advancement of the topic.b). Students should preferably refer minimum of 5 reference books/magazines.c). Format of content i. Introduction. ii. Literature survey. iii. Theory 1) Implementation 2) Methodology 3) Application 4) Advantages, Disadvantages. iv. Future scope. v. Conclusion..

Code: MCMCCV3404

Dissertation Part-I

6 Credits [LTP:-0-0-12]

The Project can be carried out in the Institution/Industry/Research laboratory or any other competent institutions.

		POORNIMA UNIVERSITY, JAIPUR							
		Faculty of Engineering and Technology							
Name of Program:	M.Tech. in Construction Technology and Management				Duration: 2 Years				
	Total Credits: 81								
		<u>Teaching Scheme for Batch 2025-27</u>							
		Semester-IV							
Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical	SH	IE	ESE	Total	
A.		Major (Core Courses)							
A.1	Theory								
-	-	-	-	-	-	-	-	-	-
A.2	Practical								
-	-	-	-	-	-	-	-	-	-
B.		Minor Stream Courses/ Department Electives/ <i>Core Elective</i>							
B.1	Theory								
-	-	-	-	-	-	-	-	-	-
B.2	Practical								
-	-	-	-	-	-	-	-	-	-
C		Multidisciplinary Courses							
-	-	-	-	-	-	-	-	-	-
D		Ability Enhancement Courses (AEC)							
-	-	-							
E		Skill Enhancement Courses (SEC)							
-	-	-	-	-	-	-	-	-	-
F		Value Added Courses (VAC)							
-	-	-	-	-	-	-	-	-	-
G		Summer Internship / Research Project / Dissertation							
MCMCCV4401	Dissertation Part - II	-	-	30	-	250	250	500	15
Total		0	0	30					15
Total Teaching Hours		30							15

Code: MCMCCV4401

Dissertation Part-II

15 Credits [LTP:-0-0-30]

The Project can be carried out in the Institution/Industry/Research laboratory or any other competent