VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI.

Scheme of Teaching and Examinations and Syllabus

M.Arch-Construction Project Management

(Effective from the academic year 2022-23)

AS PER COA:

PCC: Professional Core Courses: 50-55%

PSC: Professional supporting Course 20-25%

PCE: Professional Core Elective 15-20%

PAE: Professional Ability Enhancement:10%

OE: Open Elective: 2-5%

NEP 2020 Principles:

Main features:

1. Broad-based
2. Multi-disciplinary
3. Holistic Graduate education with a flexible curriculum
4. Creative combinations of subjects
5. Integration of vocational education
6. Self-learning process
7. StStudent-centricearning process rather than teaching

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examinations – 2022- 23
M.Arch (Construction Project Management)
Choice Based Credit System (CBCS) and Outcome Based Education(OBE)

I SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours per Week			Examination					Credits
				Theory	Practical/Studio	Skill Development Activities	Duration of examination in hours	CIE Marks	SEE Marks		Total Marks	
				L	P	SDA			Theory	Viva /TW		
1	PCC	22CPM11	Building Management (Studio)-I	02	06	00	00	50	-	50	100	8
2	PCC	22 CPM 12	Project management - 1	02	00	04	03	50	50	-	100	4
3	PCC	22 CPM 13	Contract Management	02	00	02	03	50	50		100	3
4	PCC	22 CPM 14	Advanced building materials and construction techniques	02	00	02	03	50	50		100	3
5	PCC	22 CPM 15	Site organization & construction environmental management	02	--	02	00	50	-	50	100	3
6	MC	22 CPM 16	Research Methods	01	00	02	03	50	50		100	2
7	PSC	22CPM17	PM Software -1	01	01		-	50	-	50	100	2
8	AUD	22AUD18	BOS Recommended online course	Classes and evaluation procedures are as per the policy of the online course providers								PP
			TOTAL	**12**	**07**	**12**	**12**	**350**	**200**	**150**	**700**	**25**

Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective, MC-mandatory course, AUD-Audit course, PP-Mandatory Passing.

1. Studio:
Students and course instructor/s to be involved individually or in groups to interact to enhance learning and application skills.
The students should interact with the construction industry (small, medium, and large), understand their problems or foresee what can be undertaken for study in the form of research/ case study testing projects, and for creative and innovative methods to solve the identified problem. Students will:
(i) Gain confidence in working along with construction industry professionals.
(ii) Work on different software/s(tools)to simulate, analyze and authenticate the output to interpret and conclude.
(iii) Handle advanced construction equipment and materials to enhance technical talent.

	(iv) Involve in case studies and field visits/fieldwork. (v) Accustom to codes of standards to narrow the gap between academia and construction industry. Allactivitiesshouldenhancestudent'sabilitiestoemploymentand/orself-employmentopportunities,managementskills,Statisticalanalysis,fiscalexpertise,etc. 2. Skill Development Activities: They may be in the form of periodic site visits, guest conferences, and webinars and webinars, not a fixed slot in timetables. 3. Vivavoce: The viva voce shall be conducted for a duration of 20 minutes (per student) for the subjects listed under viva voce for all the semesters. **4. Audit Courses:** The Audit course can be any course offered by other programs/ courses run under the same institution/ campus, apart from the program/ or online course from swayam/MOOC/Coursera recommended from BOS of VTU to which the student is admitted. The student shall submit a letter requesting the desired course/subject from the interesting program to the Head of Department to obtain NOC before the commencement of the semester. **5. Open Electives:** Students must obtain prior consent from the institution/department before undertaking the Open Elective Course. A certificate of online course completion is mandatory for the award of a degree. In the absence of a Certificate of Completion, the institute shall conduct an assessment/test for the student to ascertain the skills obtained in the course.
	Note: 1 L-1 Credit, 1P-1Credit, 2 hrs SDA=1 Credit, 2 hrs of Skill Development Activity hours include site visits/workshops/data collection and not included in teaching hours calculation, meant for self-exploration Need not be shown in the timetable.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Scheme of Teaching and Examinations – 2022- 23

M.Arch - Construction Project Management

Choice Based Credit System (CBCS) and Outcome Based Education(OBE)

II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination					Credits
				Theory	Practical/ Seminar	Skill Development Activities	Duration of examination in	CIE Marks	SEE Marks		Total Marks	
				L	P	SDA			Theory	Viva/TW		
1	PCC	22CPM 21	Building Management -II (Studio II)	02	06	00	00	50	-	50	100	8
2	PCC	22 CPM 22	Project management - 2	03	00	02	03	50	50	-	100	4
3	PSC	22 CPM 23	Project resource management - 1	02	--	02	03	50	50	-	100	3
4	PEC	22 CPM 24	Quality and safety management	02	--	02	03	50	50	-	100	3
5	PCC	22 CPM 25	Functional efficiency of buildings	01	01	02	00	100	-	-	100	3
6	PSC	22 CPM 26	PM Software II	02	--	--	00	50	-	50	100	2
7	PEC	22CPM27X	Professional Elective-1	--	02	--	00	50	-	50	100	2

8	AUD	22AUD 28	BOS Recommended Online course -Swayam/M	Classes and evaluation procedures are as per the policy of the online course provider								PP
TOTAL				**12**	**09**	**10**	**09**	**400**	**150**	**150**	**700**	**25**
	Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective, MC-mandatory course, AUD-Audit course, PP-Mandatory Passing.PCC: Professional core, PEC: Professional Elective.											

Professional Elective II			
Course Code under 20XXX24X	**Course title**		
22CPM271	International project management		
22CPM272	Maintenance and rehabilitation of structures		

Note:
1. Internship: All the students shall have to undergo a mandatory internship of 6 weeks during the vacation II and III semesters. A University examination shall be conducted during III semesters and the prescribed internship credit shall be counted in the same semester The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do take up/complete the internship shall be declared as fail in the internship course and have to complete the same during the subsequent University examination after satisfying the internship requirements.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examinations – 2022 – 23
M.Arch- Construction Project Management
Choice Based Credit System (CBCS) and Outcome Based Education(OBE)

III SEMESTER

Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching Hours /Week**			**Examination**				**Total Marks**	**Credits**
				Theory	**Practical/ Mini–Project/ Internship**	**Skill Development activities**	**Duration of examination in hours**	**CIE Marks**	**SEE Marks**			
				L	P	SDA			Theory	TW/ Viva		
1	PCC	22CPM31	Project resource management - 2	02	00	02	03	50	50	-	100	4
2	PSC	22 CPM 32	Building energy analysis management	02	-	02	03	50	50	-	100	4
3	PCC	22 CPM 33	Financial management	02	00	02	03	50	50	-	100	3
4	PCC	22 CPM 34	Dissertation Phase I	2	01	-	-	50	-	50	100	3
5	PSC	22CPM 35	Project formulation &Appraisal	3	-	-	03	50	00	50	100	3

6	PEC	22 CPM 36X	Professional Elective II	02	-	-	-	50	-	50	100	2
7	PSC	22 CPM 37	Internship	(Completed after II semester and before the commencement of III semesters.)				50	-	50	100	3
8	PSC	22CPM38	Real Estate Management	02	01	01	00	50	-	50	100	03
TOTAL				**17**	**02**	**07**	**12**	**450**	**150**	**300**	**900**	**25**

Note: PCC: Professional core, PEC: Professional Elective, PSC-Professional Supportive course

Professional elective II

Course Code under 22CPM36X	**Course title**
22CPM361	Airport Planning and Design
22CPM362	Infrastructure Management–Tunelling, Marine / Offshore Construction
22CPM363	Value Engineering in Construction Management
22CPM364	Disaster Management
22CPM365	Risk & Safety Management.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examinations – 2022 –23
M.Arch- Architecture & Construction Project Management
Choice Based Credit System (CBCS) and Outcome Based Education(OBE)

IV SEMESTER

Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching Hours /Week**			**Examination**					**Credits**
				Theory	**Practical/ Field work**	**Skill dev. Activity/self learning**	**Duration of examination in hours**	**CIE Marks**	**SEE Marks Viva voce**		**Total Marks**	
				L	P	SDA			Theory	TW /viva		
1	Project	22CPM41	Dissertation phase - 2 (Thesis)	02	12	12	00	50		50	100	22
2	PSC	22CPM42	Facility management	02	00	02	00	50	-	50	100	03
			TOTAL	**04**	**12**	**14**	**03**	**100**	**50**	**50**	**200**	**25**

		Note: **1. Dissertation Phase-2:** CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a Senior faculty of the department. The CIE marks awarded for project work phase -2, shall be based on the evaluation of Project Report subjected to plagiarism check, Project Presentation skill and performance in Question and Answer session in the ratio 50:25:25. SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism check, shall be as per the University norms. Open Elective: Open elective to be chosen by students based on their interest pertaining to CPM from Swayam/Mooc/Coursera etc, permission for pursuing these courses to be sought from the school. (Minimum of 12 weeks course)

Semester	Credits
I	25
II	25
III	25
IV	25
TOTAL	100.

I - SEMESTER

BUILDING MANAGEMENT(STUDIO 1)			
Course Code	22CPM11	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:06:00	Viva Marks	50
Total Hours of Pedagogy	128	Total Marks	100
Credits	08		

Course Learning objectives:

- To know the overview of building services in a multi-storeyed building.
- To know the working principles and operation and maintenance of HVAC, firefighting, and lifts.
- To study the time schedules for the installation of services in buildings.
- To study the WBS for services and analyze cost estimates.

Module-1	
Introduction to the building services (HVAC, firefighting and vertical transportation) by the faculty and book review.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the fundamentals in building services, Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*
Module-2	
Case studies and industrial visits related to the building techniques, building services and operation and maintenance, analysing the details.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concept of HVAC and fire fighting and* ***ICT and Digital support****: Video to demonstrate the process of HVAC and fire fighting. Power point presentation to elaborate Modelling of HVAC.* ***Site visit:*** *To understand the installation and other planning parameters.*
Module-3	
Preparation of time schedules related to installation of services in building.	
Teaching-Learning Process	***ICT and Digital support****: Video to demonstrate the BIM modelling .Power point presentation to elaborate Modelling of BIM.* ***Collaborative and Cooperative learning****: Students should work as group work. Preparation of time schedules for activities*
Module-4	
Preparation of work breakdown structure and estimates.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the the work breakdown structure. Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***ICT and Digital support****: Video to demonstrate the process of integrated building system. Power point presentation to elaborate integrated building system.*
Module-5	
Final presentation.	

Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work as a group and present the compilation of work starting with introduction , Creating activity schedules and estimates.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Viva voce is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in Viva is 50% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and Viva- Voce taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The viva-voce marks awarded for PSC (Professional supportive course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.

4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution**.**

Suggested Learning Resources:

Books

1. Frederick S. Merritt, Jonathan T. Ricketts, Building design and construction Handbook, McGraw-Hill Inc., 5th edition, 1994
2. Fred hall and Roger Greeno, Building Services Handbook, Routledge, 7th edition, 2013
3. . M.David Egan, Architectural Acoustics, J. Ross Pub., 2007
4. Gurcharan Singh, Jagdish Singh, Water Supply & Sanitary Engineering, Standard Publishers Distributors, 2007
5. Shri V.K. Jain, Fire Safety in Buildings, New age publishers, 2010
6. BIS, National Building Code 2005, New Delhi, 2005.
7. Heating , ventilation and air conditioning by James E Braumberg

Web links and Video Lectures (e-Resources):

NPTEL Lecture - Inputs to scheduling:
https://youtu.be/psls4kgau8c

Work Breakdown Structure in project management
https://www.youtube.com/watch?v=9mOXdcgdf_U

Skill Development Activities Suggested

- Guest Lecture from expert.
- Case Studies :
  To choose building projects(High rise buildings) where scope of services to be learnt is more .

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Students will be able to understand importance and typical services installations inside the building.	L2
CO2	To understand the working principles and maintenance of HVAC, Firefighting and lifts.	L2
CO3	To compile time schedules for installation of services in buildings.	L4
CO4	To compile WBS structure for services installation.	L4
CO5	To compile cost estimates.	L4

Program Outcome of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	M	L	H	0	H	L	L
CO2	H	L	M	L	0	0	L	0
CO3	H	L	M	L	0	0	L	0
CO4	H	L	M	L	0	0	L	0
CO5	H	L	M	L	0	0	L	0

H – High , M – Medium, L - Low

I-SEMESTER

PROJECT MANAGEMENT-I			
Course Code	**22CPM12**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:04	SEE Marks	50
Total Hours of Pedagogy	32 + 64 (SDA)	Total Marks	100
Credits	4	Exam Hours	3

Course Learning objectives:

- To stduy the basic concepts of project management.
- To know the stakeholder's role in projects and their responsibilities.
- To study and create project schedules as per concepts of PERT and CPM.
- To perform project crashing and other planning methodologies.
- To introduce basic concepts and techniques for monitoring and controlling of projects.

Module-1

Introduction to Project, its Stages, and Construction Project management: Project, Organization, Need for management of building/construction projects, Principles and Objectives of Project Management, brief understanding about study areas in Project Management. Types of Construction Projects. Project, program and portfolio management.

Teaching-Learning Process	***Direct method**: The lecture supported by the conventional method of Blackboard and chalk to introduce the concepts. Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation to elaborate more on key topics/online video's.*

Module-2

BASICS OF PROJECT MANAGEMENT: Project Life Cycle, Types of projects, Phase of the project, project management and its relevance, stakeholders of a project, structure of project organization, management levels, Fail,ures and success of a project.

Teaching-Learning Process	***Direct method : :** Lecture supported by conventional method of Blackboard and chalk to introduce the concepts Discussions, Debate, Industry interactions, and research paper/new s paper reading and inferences from the same.* ***ICT and Digital support: :** Power point presentation to elaborate more on key topics.*

Module-3

ROLES OF PROJECT MANAGER: Roles & Responsibilities of Project/ Construction Managers, Scope Management Construction: Scope Planning, Definition, Verification and Control Project Management Stages: Project planning, project scheduling and project controlling.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation to elaborate more on key topics.*

Module-4

PROJECT PLANNING& SCHEDULING: Introduction, Time Cost and Resource management, project planning, Work Breakdown Structure (W.B.S.), Planning terminologies, Network Theories CPM, PERT, Project crashing.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation to elaborate more on key topics.*

Module-5
PROJECT MONITORING AND CONTROL: Introduction, Scope verification & control, Schedule control , Cost control ,Quality control ,Performance reporting, Risk control and contract administration.

Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work on individual work. The research and learning are be shared with the class*. ***Site visits.***

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the

subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:

Books

1. Association for Project Management, 2012.A PM body of knowledge. Buckinghamshire: Association for Project Management.
2. Guide, A., 2017. Project Management Body of Knowledge (PMBOK®GUIDE).Project Management Institute.
3. Dr. K.G. Krishnamurthy and S. V. Ravindra, 2008. Construction and Project Management.
4. Hendrickson, C., Hendrickson, C.T. and Au, T 1989. Project management for construction: Fundamental concepts for owners, engineers, architects, and builders .Chris Hendrickson.
5. Chris,H.,2003.Project Management for Construction:FundamentalConceptsforOwners,Engineers,ArchitectsandBuilders. Department of Civil and Environmental Engineering.
6. Punmia, B.C. and Khandelwal,K.K.,2002.Project Planning and Control with PERT&CPM. Firewall media.
7. Jha, K.N., 2015.Construction Project Management: Theory and Practice. Pearson Education India.
8. Chitkara, K.K., 1998.Construction project management. Tata McGraw-Hill Education.

Web links and Video Lectures (e-Resources):

NPTEL Lecture
https://www.youtube.com/watch?v=RQNZWCl6eXI&list=PLBd76GK9sWTwVXm9FlVHOTXXbGY2vZR8z

NPTEL Lecture
https://www.youtube.com/watch?v=RjOA7AxOVj8

Skill Development Activities Suggested

- Guest Lecture from expert.
- Case Studies :
  Visiting construction sites / organization office to understand management techniques followed
  To manage projects.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the basic concepts of Project Management.	L2
CO2	Describe the construction project lifecycle and phases.	L2
CO3	Demonstrate the ability to perform project scheduling.	L3
CO4	Develop time schedules for the project.	L5
CO5	Apply risk management strategies to generate reports.	L3
CO6	Predict the delays in project timeline.	L4

Program Outcome of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**0**	**L**	**0**	**M**	**H**	**M**	**M**
CO2	**H**	**H**	**M**	**0**	**M**	**M**	**M**	**L**
CO3	**H**	**L**	**L**	**M**	**H**	**L**	**H**	**M**
CO4	**0**	**L**	**M**	**H**	**L**	**L**	**M**	**M**
CO5	**M**	**L**	**M**	**M**	**M**	**M**	**H**	**H**
CO6	**M**	**M**	**L**	**H**	**H**	**M**	**M**	**M**

H – High , M – Medium, L - Low

I-SEMESTER

CONTRACT MANAGEMENT			
Course Code	**22 CPM13**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	32 + 32(SDA)	Total Marks	100
Credits	3	Exam Hours	3

Course Learning objectives:

- Introduction to construction contracts. Understanding of Indian contract Act 1872.
- To familiarize about forms of contract, procedures for inviting tenders, scrutiny and comparison Of tender documents.
- Understanding about conditions of contract, contract pricing , performance and closure.
- Introduction to general conditions and special conditions of contract. Understanding model forms of contract.
- Introduction to FIDIC contracts , EPC Contracts , Design Build contract.

Module-1

CONSTRUCTION CONTRACTS: Indian Contract Act (1872): Definition of the contract as per the ACT. Valid, Voidable, Void contracts, Objectives of the act. Clauses1to75- Contract formation, contract performance, valid excuses for non-performance, Breach of contract, effects of breach-understanding the Clauses and applying them to situations/scenarios on construction projects.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-2

CONTRACT FORMATION: Standard forms of contracts, methods of inviting tenders, pre-bid meetings, prequalification system, scrutiny of tenders and comparative statement.

Teaching-Learning Process	***Direct method : :*** *Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***ICT and Digital support: :*** *Power point presentation to elaborate more on key topics.*

Module-3

CONTRACT FORMATION: conditions of contracts, contracts with various stakeholders on a major construction project, contract pricing by the client, project management consultants and the contractor, contract performance, contract correspondence and contract closure.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation to elaborate more on key topics.*

Module-4

CONTRACT CONDITIONS: a) General condition and Particular conditions, b) Conditions of Ministry of Statistician Program Implementation- Government of India. Model forms of contract.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation and webinars.*

Module-5	
FIDIC: ICE conditions-Introduction, FIDIC conditions- evolution of FIDIC document, types based on whether design is of employer or contractor, Design & Build contract, EPC contract, short forms of contract- Colour Code. Various conditions of Red Book.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Collaborative and Cooperative learning***: *Students should work on as individual work. The research and learning to be share with the class.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester.

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks.

Suggested Learning Resources:

Books

1. Clough,R.H.,Sears,G.A.,Sears,S.K.,Segner,R.O.andRounds,J.L.,2015.ConstructionContracting:APracticalGuidetoCompanyManagement.JohnWiley&Sons.
2. Building and Engineering contracts Law and Practice by P.C. Makranda
3. Digest of Indian Contract Act 1872(2011onwards)
4. Law of contract Part I and Part II,Dr.R.K. Bangia-2005Edition,AllahabadLawAgency
5. Standard General Conditions for Domestic Contracts-2001Edition-Published by Ministry Of Statistics and Program Implementation, Government of India.
6. FIDIC Document (1999).

Web links and Video Lectures (e-Resources):

NPTEL Lecture
https://www.youtube.com/watch?v=RQNZWCl6eXI&list=PLBd76GK9sWTwVXm9FlVHOTXXbGY2vZR8z

Web Link
https://www.udemy.com/course/contracts-management-in-construction-projects/

Skill Development Activities Suggested

- Guest Lecture from expert.
- Interviews from contract management experts

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Describe the construction contracts and its silent features.	L1
CO2	Explain the methods of inviting tenders, scrutiny and award of contract.	L1
CO3	Summarize and interpret the conditions of contract.	L2
CO4	Describe the contracts framed by the government.	L1
CO5	Interpret and classify the international contracts	L2

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**L**	**M**	**L**	**0**	**0**	**L**	**0**
CO2	**H**	**L**	**L**	**L**	**0**	**0**	**L**	**0**
CO3	**H**	**L**	**L**	**M**	**0**	**0**	**L**	**0**
CO4	**H**	**L**	**L**	**L**	**0**	**0**	**L**	**0**
CO5	**H**	**L**	**L**	**L**	**0**	**0**	**L**	**0**

H – High , M – Medium, L - Low

I- SEMESTER

ADVANCED BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES			
Course Code	**22 CPM14**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	32 +32(SDA)	Total Marks	100
Credits	3	Exam Hours	3

Course Learning objectives:

- Describe the manufacturing, properties and uses cements. Understand its application in construction activities.
- Understand the uses and application of specialized concrete.
- Introduction to large span structures and methods to construct it.
- Introduction to bridges and its basic structural details.
- Learning about special structures like silos, chimneys. Its transportation, handling and erection.

Module-1	
Lime, Pozzolana cements, Raw materials, Manufacturing process, Properties and uses. Fibres- metal and synthetic, Properties and applications. Fibre reinforced plastics, Matrix materials, Fibers organic and synthetic, Properties and applications. Building materials from agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:*** *Power point presentation and webinars.*

Module-2	
Definition & Introduction, General properties, Advantages, Disadvantages, Applications, High density concrete, Shrinkage compensating concrete, Mass concrete, Roller compacted concrete. Light weight concrete, High strength concrete, Ultra-high strength concrete (reactive powder concrete), High workability concrete/Self compacting concrete, Fibre reinforced concrete, Polymer-concrete composites.	
Teaching-Learning Process	***Direct method : :*** *Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***ICT and Digital support: :*** *Power point presentation to elaborate more on key topics.*

Module-3	
Conceptual understanding of various large span structures; Principles, methods of fast track of construction projects.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation to elaborate more on key topics.*

Module-4	
Bridges, types of construction of special type of bridges such as cable stayed bridge, suspension and prestressed bridge, construction of foundation and super structure.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation and webinars.*

Module-5	
Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – cooling towers, silos, chimney – erection techniques of tall structures – erection of articulated structures – aerial transporting, handling, erecting light weight components on tall structures, In-situ pre-stressing in high rise structures. Composite construction of steel and concrete. Rapid construction techniques.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Collaborative and Cooperative learning***: *Students should work on as individual work. The research and learning to be share with the class.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester.

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)
6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:

Books

1. S.S.Ataev,"Construction Technology", Mir Publishers
2. P. Dyanchenko & S. Mirotvorsky, "Prefabrication of Reinforced Concrete", Mir Publishers
3. Henrick Nissen, "Industrial Building and Modular Design", Cement Concrete Association, London.
4. R.Chudley,"Construction Technology",(Vol. I to IV)Longman
5. Robert wade Brown, "Practical foundation engineering handbook Graw Hill Publications.
6. Patrick Powers. J., "Construction Dewatering: New Methods and Applications", John Wiley &Sons.
7. Roy Chudley & Roger Greeno,"Advanced Construction Techniques", Pearson Prentice Hall
8. Peurifoy,"Construction Planning, Equipment & Method", Tata Mc Graw Hill Pub.
9. SanksarS, SaraswatiS,"ConstructionTechnology",OxfordUniversityPress

Web links and Video Lectures (e-Resources):

NPTEL Lecture
https://www.youtube.com/watch?v=RSnNrQUTEnY&list=PLyqSpQzTE6M_k_G-Lwpb4UUxYUQ-garG1
https://www.youtube.com/watch?v=2B7DhQvL8kw&list=PLwdnzlV3ogoVGSUhjx4VzW-dGz7DqQFoj

Web Link
https://onlinecourses.nptel.ac.in/noc19_ce44/preview

Skill Development Activities Suggested

- Guest Lecture from expert.
- Site visits to major construction sites which have specialized materials and construction techniques.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Describe the properties of cement and explain its manufacturing process.	L1
CO2	Compare the construction materials and extract the relevant information	L1
CO3	Describe the concepts of long span structures	L1
CO4	Classify different types of special structures and summarize its construction techniques.	L2
CO5	Devise schedules to fast track construction projects.	L4

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**M**	**L**	**M**	**M**	**L**	**0**	**M**	**0**
CO2	**H**	**L**	**L**	**L**	**0**	**L**	**M**	**0**
CO3	**H**	**L**	**L**	**L**	**0**	**0**	**L**	**0**
CO4	**H**	**L**	**L**	**L**	**0**	**0**	**L**	**0**
CO5	**H**	**M**	**M**	**M**	**0**	**M**	**L**	**0**

H – High , M – Medium, L - Low

I - SEMESTER

SITE ORGANIZATION & CONSTRUCTION ENVIRONMENTAL MANAGEMENT			
Course Code	**22 CPM15**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	Viva Marks	50
Total Hours of Pedagogy	32 +32(SDA)	Total Marks	100
Credits	3		

Course Learning objectives:

- To understand the site layout and site setup required to start the construction activites.
- To give an overview of rules and regulations governing the pollution control arising out of construction.
- An overview of site waste material management.
- To familiarize about quality of concreting at site and strategies to improve site productivity.
- To understand about the concepts of site contamination arising out of construction work.
- Basic understanding of wastage auditing and waste exchange approach plan.

Module-1	
Demolition. The site (Layout and Organization). Site inputs planning. Site works planning, Temporary construction lighting. Electricity on building site. Winter and Monsoon Construction.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-2	
Site cost control techniques. Site quality control operations, Quality control of concreting and steel. Improving site productivity. Site accounts.	
Teaching-Learning Process	***Direct method : :*** *Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***ICT and Digital support: :*** *Power point presentation to elaborate more on key topics.*

Module-3	
An integrative methodology & Effective prevention at preconstruction stage: Local regulation of CEM. Qualitative analysis of construction pollution. Construction pollution measurements. Project scheduling together with EM using CPI. A pseudo-resource approach for CPI levelling. CPI levelling using GA. Introduction to DEMAP and DEMAN. CEM reports. Site waste material management plan	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation to elaborate more on key topics.*

Module-4	
Effective control at construction stage: General construction waste. CEM construction technologies. CEM materials. Management methods. Incentive reward programs. Barcoding technologies in CEM. Addressing air quality in the CEMP. Addressing noise in the CEM. Site contamination. Addressing water quality in the CEM. Implementation of environmental report during construction.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts., Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:*** *Power point presentation and webinars.*

Module-5	
Effective reduction at post construction Contaminated land remediation. Salvaging, Recycling. Disposing of non-hazardous demolition and construction waste. Wastage audit at site. Online waste exchange approach plan.	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Collaborative and Cooperative learning***: *Students should work on as individual work. The research and learning to be share with the class.*

Assessment Details (both CIE and Viva voce)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 50% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The viva-voce marks awarded for PSC (Professional supportive course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.

4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

1. Jain,R.K.andRao,S.S.,2008.Industrialsafety,health and environment management systems. Romesh Chander Khanna.
2. Ferrett,E.andHughes,P.,2015.IntroductiontohealthandsafetyinconstructionFortheNEBOSHnational certificate in construction health and safety. Routledge.
3. Basudev Panda,2013Industrial Safety, Health Environment and Security. Laxmi Publications; First Ed.
4. Li,H.andChen,Z.,2007.Environmental Management in Construction: A Quantitative Approach.
5. Griffith,A.,1994.Environmental management in construction. Macmillan International Higher Education.
6. Uren,S.andGriffiths,E.,2000.Environmental management in construction.
7. Rapp,R.R.andBenhart,B.L.eds.,2015.Construction Site Planning and Logistical Operations:Site-

FocusedManagementforBuilders.PurdueUniversityPress.

Web links and Video Lectures (e-Resources):

NPTEL Lecture
https://www.youtube.com/watch?v=RSnNrQUTEnY&list=PLyqSpQzTE6M_k_G-Lwpb4UUxYUQ-garG1
https://www.youtube.com/watch?v=2B7DhQvL8kw&list=PLwdnzlV3ogoVGSUhjx4VzW-dGz7DqQFoj

Web Link
https://onlinecourses.nptel.ac.in/noc19_ce44/preview

Skill Development Activities Suggested

- Guest Lecture from expert.
- Site visits to major construction sites to understand the site setup process and managing construction Wastes, auditing, and reclamation

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Explain the functioning site organization and its layout for carrying out construction activities.	L1
CO2	Describe the cost control techniques and identify the areas of cost escalation	L1
CO3	Summarize the quality control procedures for steel and concrete	L1
CO4	Devise a remedial measure to reduce site contamination and do wastage auditing	L4
CO5	Plan a schedule to control construction pollution	L5

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	0	M	M	L	0	L	0
CO2	H	0	M	M	0	0	M	0
CO3	H	L	L	M	0	L	L	0
CO4	H	L	M	M	L	M	M	0
CO5	H	L	0	M	0	0	M	0

H – High , M – Medium, L - Low

I - SEMESTER

RESEARCH METHODS			
Course Code	**22 CPM16**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	01:00:02	SEE Marks	50
Total Hours of Pedagogy	16+32(SDA)	Total Marks	100
Credits	2	Exam Hours	3

Course Learning objectives:

- To understand the meaning of research. Types and research approaches
- To develop understanding of conducting literature review, its methodology and reviewing the Existing literature.
- To familiarize about sampling techniques and data collection methods.
- To study about testing of hypothesis.
- To learn about interpreting the data and report writing.

Module-1

Research Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India

Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, and Illustration.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation and webinars.*

Module-2

Reviewing the literature: Place of the literature review in research, bringing clarity and focus to your research problem, improving research methodology, broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing atheoretical framework, Developing a conceptual framework, Writing about the literature reviewed.

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.

Teaching-Learning Process	***Direct method :*** *: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***ICT and Digital support: :*** *Power point presentation to elaborate more on key topics.*

Module-3

Design of Sampling: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.

Measurement and Scaling: Qualitative and Quantitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement Tools, Scaling , Scale Classification Bases, Scaling Technics, Multi-dimensional Scaling, Deciding the Scale.

Data Collection: Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method of or Data Collection, Case Study Method.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation to elaborate more on key topics.*

Module-4

Testing of Hypotheses: Hypothesis, Basic Concepts Concerning Testing of Hypotheses, Testing of Hypothesis, Test Statistics and Critical Region ,Critical Value and Decision Rule, Procedure for Hypothesis is Testing, Hypothesis Testing for Mean, Proportion, Variance, for Difference of Two Mean, for Difference of Two Proportions, for Difference of Two Variances, P-Value approach, Power of Test, Limitations of the Tests of Hypothesis.

Chi-square Test: Test of Difference of more than Two Proportions, Test of Independence of Attributes, Test of Goodness of Fit, Cautions in Using Chi Square Tests.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*

Module-5

Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of
Writing a Research Report, Precautions for Writing Research Reports.

Intellectual Property: The Concept.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Collaborative and Cooperative learning**: Students should work on as individual work. The research and learning to be share with the class.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration01 hours)
6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

. Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:

Books

1. Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg, New Age International,4thEdition, 2018.
2. Research Methodology a step-by-step guide for beginners.(For the topic Reviewing the literature under module 2),RanjitKumar,SAGEPublications,3rdEdition, 2011.
3. Study Material (For the topic Intellectual Property under module5), Professional Programme Intellectual Property Rights, Law and Practice, The Institute of Company Secretaries of India,
4. Statutory Body Under an Act of Parliament, September2013.
5. Research Methods: The concise knowledge base, Trochim, Atomic Dog Publishing,2005.
6. Conducting Research Literature Reviews: From the Internet to Paper, FinkA,SagePublications,2009.

Web links and Video Lectures (e-Resources):

NPTEL Lecture
https://www.youtube.com/watch?v=rz30rRfManE&list=PLdj5pVg1kHiOypKNUmO0NKOfvoIThAv4N

Web Link
https://onlinecourses.nptel.ac.in/noc22_ge08/preview

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Explain about meaning of research, its objectives, and types.	L1
CO2	Describe about selecting a research problem and defining it	L1
CO3	Explain the process of literature review, and improving research methodology	L1
CO4	Interpret the necessary data to develop a conceptual framework and theoretical framework	L2
CO5	Explain about conducting surveys, data collection and choosing appropriate methods of data collection	L1
CO6	Use hypothesis techniques to extrapolate data from samples.	L3
CO7	Interpret the data and write research reports.	L2

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	M	M	M	0	L	H	L
CO2	H	M	M	M	0	L	H	L
CO3	H	M	M	M	0	0	H	0
CO4	H	0	M	M	0	0	H	0
CO5	H	H	M	M	0	0	H	L
CO6	H	L	M	M	0	0	H	0
CO7	H	L	M	M	0	0	H	L

H – High , M – Medium, L - Low

I - SEMESTER

PM SOFTWARES 1			
Course Code	**22 CPM17**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	01:01:00	Term work	50
Total Hours of Pedagogy	32	Total Marks	100
Credits	2		

Course Learning objectives:

- To understand the work environment of MS Project.
- To create a project template and assign a calendar.
- To Create a work breakdown structure.
- To develop resources for project and assign them to activities and manage the resources.
- Prepare a project baseline and compare them with actual progress.

Module-1	
Getting Started with Microsoft Project: Identify Project Management Concepts Navigate the Microsoft Project Environment	
Teaching-Learning Process	***Blended learning:*** *Power point presentation and webinars.*

Module-2	
Defining a Project: Create a New Project Plan Define a Project Assign a Project Calendar.	
Teaching-Learning Process	***Blended learning:*** *Power point presentation and webinars.*

Module-3	
Creating and Organizing Tasks: Add Tasks to a Project Plan, Import Tasks from Other Programs Create a Work Break down Structure, Define Task Relationships ,Schedule Tasks	
Teaching-Learning Process	***Blended learning:*** *Power point presentation and webinars.*

Module-4	
Managing Project Plan Resources: Add Resources to a Project Plan Create a Resource Calendar Enter Costs for Resources Assign Resources to Tasks, Resolve Resource Conflicts	
Teaching-Learning Process	***Blended learning:*** *Power point presentation and webinars.*

Module-5
Finalizing a Project Plan: Optimize a Project Plan, Set a Baseline, Share a Project Plan.

Teaching-Learning Process	***Blended learning:*** *Power point presentation and webinars.*

Assessment Details (both CIE and Viva voce)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 50% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and G uide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Semester End Examination:

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The term work will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The term work marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

1. Marmel,E.,2011.Microsoft Project 2007 Bible(Vol.767).John Wiley& Sons.
2. Larson, E. and Gray, C., 2013. Project management: The managerial process with MS project. McGraw-Hill Education.
3. Biafore,B.,2013.Microsoftproject2013:Themissingmanual."O'ReillyMedia,Inc.".
4. Ambriz, R. and Landa, M., 2014. Dynamic Scheduling® WithMicrosoft®Project2013: TheBook By and For Professionals .J. Ross Publishing.

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=5v_42_4Vl2o

Web Link
https://www.tutorialspoint.com/ms_project/index.htm

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Understand the Microsoft project software environment	L1
CO2	Develop project plan and assign calendars.	L6
CO3	Develop tasks and create work breakdown structure	L6
CO4	Create resources and modify it.	L6
CO5	Modify the project plan to reach the targets and create project baselines	L6

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	M	L	H	0	L	L	0
CO2	H	0	L	H	0	L	L	0
CO3	H	0	L	H	0	L	L	0
CO4	H	0	L	H	0	0	L	0
CO5	H	0	L	H	0	0	L	0

H – High , M – Medium, L - Low

II - SEMESTER

BUILDING MANAGEMENT (Studio 2)			
Course Code	**22 CPM21**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:06:00	Viva Marks	50
Total Hours of Pedagogy	128	Total Marks	100
Credits	8		

Course Learning objectives:

- To understand the services aspects of high-rise building.
- To analyse operation and maintenance of such services.
- To prepare time schedules for installation services in the building.
- To prepare work breakdown structure for services

Module-1	
Introduction to the building services (Electrical, building automation and infrastructure services) by the faculty and book review.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-2	
Case studies and industrial visits related to the building techniques, building services and operation and maintenance, analysing the details.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*
Module-3	
Preparation of time schedules related to installation of services in building.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*
Module-4	
Preparation of work breakdown structure and estimates.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-5	

Final presentation.

Teaching-Learning Process	***Blended learning:*** *Power point presentation and webinars.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The viva-voce marks awarded for PSC (Professional supportive course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.

4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

1. Introduction to the Design and Analysis of Building Electrical Systems
2. Electrical Design Guide for Commercial Buildings. Book by William H. Clark
3. Energy-Efficient Electrical Systems for Buildings Book by Moncef Krarti
4. Intelligent Buildings and Building Automation. Book by Shengwei Wang
5. Construction and Building Automation: From Concepts to ...Book by Benny Raphael

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=0LNklcBhl_Q&list=PLp6ek2hDcoNCb0R8gxk1WzpTN94eXs9vb

Web Link
https://guides.smartbuildingsacademy.com/building-automation-system

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Explain the essential services in a multi storeyed building.	L1
CO2	Describe the operation and maintenance of the services in building.	L1
CO3	Devise a work breakdown structure for the packages	L4
CO4	Write time schedules for different work packages	L6
CO5	Write cost estimates for work related to services.	L6

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	L	0	M	0	M	L	0
CO2	H	L	0	O	O	M	0	0
CO3	H	L	0	M	0	M	0	0
CO4	H	M	0	L	0	0	L	0
CO5	H	L	0	L	0	L	L	0

H – High , M – Medium, L - Low

II- SEMESTER

PROJECT MANAGEMENT -2			
Course Code	**22CPM22**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:02	SEE Marks	50
Total Hours of Pedagogy	48+32(SDA)	Total Marks	100
Credits	04	Exam Hours	3

Course Learning objectives:

- Understanding about project management concepts from PMBOK.
- Introduction to project communication, procurement and cost management,
- Familiarize about the concepts of resource management and conflict management and dispute resolution.
- To understand the role of stake holder in a project and ways to maintain stakeholder registry.
- T o understand the roles of construction manager and contractor.
- To analyze manager's role in contract signing.

Module-1

Introduction to project management topics: Project Charter, Project Management Plan, Project Management, Programme Management &Portfolio Management, Stakeholder Management, Scope Management, Schedule Management, Change Management.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-2

Introduction to project management topics: Communication Management, Procurement Management, Cost Management, Quality Management, Safety Management, Strategy Management.

Teaching-Learning Process	***Direct method****: Lecture supported by the conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research news paper reading and inferences from the same.* ***Blended learning:*** *Powerpoint presentation and webinars.*

Module-3

Introduction to project management topics: Resource Management, Conflict Management & Dispute resolution, contract Management, Design Management, Benefits Management, Project Closure.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:*** *Power point presentation and webinars.*

Module-4

Stake holder management: Definition of stakeholder, Stakeholder category. Stakeholder groups-Team member, Executive and other stakeholder. Stakeholder registry. Stakeholder management. Stakeholder communication, managing stakeholders in virtual world,
Managing difficult stakeholder.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*
Module-5	
Construction Management: Introduction, Understand the role and the importance of the construction manager to the project, construction managers tasks, difference between a construction manager and a genera lor prime contractor for a construction project, Define due diligence and how it applies to construction projects, Understand the construction managers role in contract signing, Carry out the Construction managers duties.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks.

Suggested Learning Resources:

Books

1. Association for Project Management, 2012.A *PMbody of knowledge*. Buckinghamshire: Association for Project Management.
2. Guide, A., 2017. Project Management Body of Knowledge *(PMBOK®GUIDE)*. Project Management Institute.
3. Dr.K.G. Krishnamurthy and S.V. Ravindra, 2008.*Construction and Project Management*.
4. Hendrickson, C., Hendrickson, C.T. and Au, T., 1989. Project management for construction: Fundamental concepts for owners, engineers, architects, and builders. Chris Hendrickson.
5. Chris, H., 2003. Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects and Builders. Department of Civil and Environmental Engineering.
6. Punmia, B.C. and Khandelwal, K.K.,2002. *Project Planning and Control with PERT&CPM*. Fire wall media.
7. Jha, K.N., 2015.Construction Project Management: Theory and Practice. Pearson Education India.

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=0LNklcBhl_Q&list=PLp6ek2hDcoNCb0R8gxk1WzpTN94eXs9vb

Web Link
https://guides.smartbuildingsacademy.com/building-automation-system

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Describe about the concepts of project management as detailed in PMBOK.	L1
CO2	Interpret the concepts of communication, procurement, cost and quality management for construction projects.	L2
CO3	Explain about strategies to manage resources , conflicts in construction site.	L4
CO4	Describe about handling contracts and design management .	L1
CO5	Classify stakeholders and there roles.	L2
CO6	Interpret the roles and responsibilities of project manager.	L2
CO7	Describe the differences in construction manager and contractor roles in a project.	L1

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**L**	**L**	**L**	**0**	**0**	**M**	**0**
CO2	**H**	**L**	**L**	**L**	**0**	**L**	**M**	**L**
CO3	**H**	**M**	**M**	**M**	**0**	**0**	**L**	**L**
CO4	**H**	**M**	**0**	**L**	**0**	**0**	**M**	**0**
CO5	**H**	**M**	**L**	**L**	**0**	**0**	**L**	**0**
CO6	**H**	**L**	**L**	**L**	**0**	**0**	**L**	**L**
CO7	**H**	**M**	**L**	**L**	**0**	**0**	**L**	**0**

H – High , M – Medium, L - Low

II - SEMESTER

PROJECT RESOURCE MANAGEMENT -1			
Course Code	**22CPM23**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	32+32(SDA)	Total Marks	100
Credits	03	Exam Hours	3

Course Learning objectives:

- To know the process of planning, maintaining and replacement of construction equipment's.
- To study the concepts of inventory management and store management.
- To know the types of construction equipment's used in the projects.
- To study the human resources aspects of construction projects.
- To know about wage rates and resources productivity.
- To study about effective communication management between project team members.

Module-1	
CONSTRUCTION EQUIPMENT MANAGEMENT Identification – Planning – Equipment Management in Projects – Maintenance Managements – Replacement – Cost Control of equipment – Depreciation Analysis – Safety Management	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:*** *Power point presentation and webinars.*

Module-2	
CONSTRUCTION MATERIAL MANAGEMENT: Importance of material Management – Classification and Codification of materials, Inventory Control – Managing the Inventory and Flow of raw materials, Work – in – Process, Finished Goods, and Supplies to ensure / enhance the organization's competitiveness and profitability, Application of ABC Analysis in inventory control, Inventory Management Safety Stock, Stock Outs. Stores Management: Quality control, Use of (MMS) – Materials Management Systems	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-3	
Fundamentals of Earthwork Operations – Earth Moving Operations – Types of Earthwork Equipment – Tractors, Motor, Graders, Scrapers, Front end Waders, Earth Movies. Equipment for Dredging, Trenching, Tunnelling, Drilling, Blasting – Equipment for Compaction – Erection Equipment – Types of pumps used in construction. Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment Forklifts and Related Equipment – Portable Materials Bins – Conveyors – Hauling Equipment	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts., Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-4
HUMAN RESOURCE DEVELOPMENT Introduction – Organization – Fulcrum of the modern enterprise – informal groups – Management – Employees – Human resource management.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:** Power point presentation and webinars.*

Module-5

MANAGING PERSONNEL AND RELATIONS: Personnel management – nature and scope – personnel plan – personnel department – manpower planning, recruitment and selection. In-service training – Training Inputs – Principles – Types – Assessments. Wages and salary administration – Wage rate – Wage payment methods – Incentive plan – Fringe benefits – Productivity earnings and profit sharing – Bonus payment – Wage legislation – Wage administration. Productivity in construction – measuring productivity – Factors affecting productivity – Responsibility for productivity. Employees relation in an organization – Characteristics of groups – Roles of project manager – Communication – Types of communication - Communication process – Effective communication – the art of listening – Motivating employees – Hierarchy of motivation.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester.

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:
Books

1. Peurifoy, R.L., Ledbetter, W.B.and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.

2. Sharma S.C. "construction Equipment and Management", Khanna Publishers New Delhi, 1988.

3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers New Delhi, 1988.

4. Dr.Mahesh Varma, "Construction Equipment and its Planning and Application", Metro –Politan Book Company, New Delhi, 1983 5. Journals such as Civil Engineering and Construction Review (CE&CR), New building materials and Construction world (NBM &CW).

6. 'Materials of Construction' by Ghose, Tata – McGraw Hill Publication.
7. Handbook of Materials Management – Gopalkrishnan, Prentice Hall Publication.

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=2B7DhQvL8kw&list=PLwdnzlV3ogoVGSUhjx4VzW-dGz7DqQFoj

Web Link
https://lecturenotes.in/subject/202/construction-equipments-planning-and-management-cepm/note

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Describe the planning strategies in the procurement of equipment's	L1
CO2	Explain the process and control of inventory and stores management	L1
CO3	Classify the construction equipment's used in the projects.	L2
CO4	Explain about the organization setup and human resource management	L1
CO5	Describe about the ways of managing wages and man power requirement	L1
CO6	Explain about the ways of implementing effective communication	L2

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**L**	**L**	**H**	**O**	**0**	**L**	**0**
CO2	**H**	**L**	**L**	**H**	**O**	**0**	**L**	**0**
CO3	**H**	**L**	**L**	**M**	**0**	**0**	**L**	**0**
CO4	**H**	**M**	**L**	**0**	**0**	**L**	**L**	**L**
CO5	**H**	**M**	**L**	**L**	**0**	**0**	**L**	**L**
CO6	**H**	**H**	**L**	**L**	**0**	**0**	**L**	**0**

H – High , M – Medium, L - Low

Semester- II

QUALITY AND SAFETY MANAGEMENT			
Course Code	**22CPM24**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	32+32(SDA)	Total Marks	100
Credits	03	Exam Hours	3

Course Learning objectives:

- To know about the customer satisfaction ergonomics in quality
- To study the concept of total quality control in construction.
- To know the QA and QC programs in project inception and execution stages.
- To study the procedures in carrying the quality audit and monitoring.
- To introduce the concept of standardization in construction activites.
- To familiarize about site safety management and OSHAAS guidelines.

Module-1	
QUALITY MANAGEMENT: Quality policy in construction industry-Consumer satisfaction Ergonomics, Time of Completion-Statistical Tolerance-concept of quality-Contract and construction programming-Inspection procedures, total quality control concept, sustainable construction methods.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*

Module-2	
QUALITY ASSURANCE AND CONTROL: Total Quality Assurance and Quality Control Program and cost implication. Different aspects of quality Appraisals, failure mode analysis, Stability methods and tools, Influence of drawings ,detailing, specification.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts* ***Blended learning:** Power point presentation and webinars.*

Module-3	
Quality assurance protocols, work procedure preparation, advanced quality programs, Quality audit and monitoring, Quality circles.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*

Module-4	
STANDARDIZATION AND SAFETY: Standardization-Bid Preparation-Construction activity, the SOP method, Construction Safety–Theory, meaning and scope.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*

	Blended learning: *Power point presentation and webinars.*

Module-5

SAFETY PROGRAMMES AND ORGANIZATION: Environmental safety, Social and environmental factors, Hazards in construction projects, mitigation and preventive measures, OSHAAS guidelines for construction safety, repercussions of construction accidents ,construction accident reporting ,Contractual obligations for construction safety, EHS budgeting.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)
6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:
Books

- Construction Safety (Safety Management) by S Ganguly& CS Changeriya
- Quality on Site by FergusonI and Mitcheel Eric
- Quality management-The project Managers perspective. By Patterson John
- Levitt, R.E. and Samelson,N.M.,1993. Construction safety management. John Wiley Sons.
- Zou, P.X.and Sunindijo,R.Y.,2015.Strategicsafetymanagementinconstructionandengineering.John Wiley& Sons.
- Lingard, H. and Rowlinson,S.M.,2005.Occupationalhealthandsafetyinconstructionproject management. Taylor & Francis.
- Rumane, A.R.,2016.Quality management in construction projects. Crc Press.
- Howarth, T. and Watson,P.,2012.Constructionqualitymanagement:Principles and practice. Routledge.

Web links and Video Lectures (e-Resources):

Video Tutorial
Safety Management
https://www.youtube.com/watch?v=Bh_LYZh3KH4
https://www.youtube.com/watch?v=ypTiYyh7YT0
Web Link

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Explain about the quality control and customer satisfaction in construction projects	L1
CO2	Describe about the concepts of QA and QC.	L1
CO3	Interpret the methodology in quality appraisal, failure mode analysis.	L2
CO4	Summarize the influence of drawings on quality	L2
CO5	Describe about the procedure for quality assurance protocols, quality audit and monitoring	L1
CO6	Explain about concepts of standardization in construction project	L1
CO7	Explain about safety parameters in construction detailing about OSHAAS guidelines Contractual obligations.	L1

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**0**	**L**	**0**	**0**	**0**	**L**	**0**
CO2	**H**	**0**	**L**	**L**	**0**	**0**	**L**	**0**
CO3	**H**	**0**	**0**	**L**	**0**	**0**	**L**	**0**
CO4	**H**	**0**	**L**	**L**	**0**	**0**	**L**	**0**
CO5	**H**	**L**	**L**	**L**	**L**	**0**	**L**	**0**
CO6	**H**	**L**	**L**	**L**	**L**	**0**	**L**	**0**
CO7	**H**	**L**	**0**	**0**	**0**	**M**	**M**	**L**

H – High , M – Medium, L - Low

II -SEMESTER

FUNCTIONAL EFFICIENCY OF BUILDINGS			
Course Code	**22CPM25**	CIE Marks	100
Teaching Hours/Week (L:P:SDA)	01:01:02	SEE Marks	00
Total Hours of Pedagogy	16+16+32(SDA)	Total Marks	100
Credits	03		

Course Learning objectives:

- To know the concepts of climatic behaviour on the building.
- To study different shading devices available to avoid penetration of solar radiation in buildings.
- To know the fundamentals of ventilation, wind effects on buildings.
- To study basics of acoustics and design consideration for treatment in lecture halls, Theatres etc.
- To familiarize about Indian Green Building Council , LEED and its rating system.

Module-1

THERMAL BEHAVIOUR OF BUILDINGS: Introduction to concept of Effective Temperature – Corrected Effective Temperature – Procedures- Comfort zone – Overheated Period – design of shading devices – resistance and conductance – transmittance – thermal gradient – Periodic heat flow – Time lag and decrement factor – Procedures - Thermal exchange in buildings –Building heat gain and heat loss.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-2

PLANNING FOR VENTILATION: Functions of ventilation – Stack effect – calculations – provision for Air movement – air flow through buildings– calculation of indoor air velocity – ventilation rate - orientation, external features, cross ventilation – position of openings, size of openings, controls of openings- calculations- air flow around buildings – humidity control.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:*** *Power point presentation and webinars.*

Module-3

DAYLIGHTING: Principles of light- transmission, reflection, and absorption – illumination – day lighting concepts - day lighting in the tropics – daylight requirements – daylight protractor – calculations – distribution of daylight.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Module-4

ACOUSTICS: Acoustic considerations in Open plan offices, Lecture rooms, Lecture Halls, Seminar halls, Recording Studios, Broadcasting studios, Opera House, Worship places. Acoustic considerations in ancient theatres, basic theatre stages, performance spaces and types. Design principles for Auditoriums- side wall, rear wall & ceiling treatment, sound reinforcing systems home theatres, digital media auditorium & auditorium for the future.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same*

	Blended learning: *Power point presentation and webinars.*

Module-5

GREEN BUILDINGS: Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency.

Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts, Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same..* ***Blended learning:*** *Power point presentation and webinars.*

Assessment Details (CIE Marks)

The weightage of Continuous Internal Evaluation (CIE) is 100% The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 50% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)
6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks.

Suggested Learning Resources:
Books

- Koenigsberger, O. H., Ingersoll, T. G., Mayhew. A,Szokolay.S.V, Manual of Tropical Housing and Building, Part 1 – Climatic
- Design, Orient Longman Pvt. Ltd, Chennai,2004
- Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980
- Arvind Krishnan, Nick Baker, Simons Yannas, S V Szokolay, Climatic Responsive Architecture- A Design Handbook for
- Energy Efficient Buildings, Tata Mc Graw Hill Publishing Company Ltd, New Delhi,2001
-
- BIS, SP 41: Handbook on Functional Requirements of Buildings (Other than Industrial Buildings), 1987
- David Egan. M, Concepts in Thermal Comfort, Prentice Hall, 1975
- Baruch Givoni, Climate considerations in building and urban design, John Wiley & Sons, New York, 1998

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=Rk1OF2qB5Ag&list=PLccFEq6jzqernMuP0HmIsGz37Tm9T7vgO

Web Link
https://cementconcrete.org/building-construction/functional-components-building-structure/3246/

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Explain the effects of climate and its factors on build environment.	L1
CO2	Describe the fundamentals and concepts of ventilation on built environment	L1
CO3	Describe the fundamentals and concepts of daylighting	L1
CO4	Explain the acoustical treatment for theatres, recording studios and broadcasting studios.	L1
CO5	Summarize the IGBC and LEED building codes for specific building typologies	L2

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**0**	**L**	**L**	**0**	**0**	**M**	**0**
CO2	**H**	**0**	**L**	**L**	**0**	**0**	**M**	**0**
CO3	**H**	**0**	**L**	**L**	**0**	**0**	**M**	**0**
CO4	**H**	**0**	**M**	**L**	**0**	**0**	**M**	**0**
CO5	**H**	**L**	**M**	**L**	**0**	**0**	**M**	**0**

H – High , M – Medium, L - Low

Semester- II

PM SOFTWARES II			
Course Code	**22CPM26**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:00	Term work	50
Total Hours of Pedagogy	28	Total Marks	100
Credits	02		

Course Learning objectives:

- To know the work environment of Primavera
- To create a project template and assign a calendar.
- To Create a work breakdown structure.
- To develop resources for project and assign them to activities and manage the resources.
- Prepare a project baseline and compare them with actual progress.

Module-1	
Introduction to Primavera and its frame work Data, Navigating, and Layouts Enterprise Project Structure Creating a Project Creating a Work Breakdown Structure.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-2	
Adding Activities Creating Relationships Scheduling Assigning Constraints.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-3	
Maintaining the Project Documents Library Formatting Schedule Data, Roles and Resources Assigning.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-4	
Assigning Resources and Costs Analyzing, Resources Optimizing the Project Plan	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-5	

Baselining the Project Plan, Project Execution and Control Reporting Performance	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:*** *Power point presentation and webinars.*

Assessment Details (Viva voce)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 50% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD

.

2. The term work will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The term work marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

- Harris, P.E., 2016.Planning*&ControlUsingOraclePrimaveraP6 Versions 8, 15 & 16 PPM Professional*. Eastwood Harris Pty Ltd.
- Winter, R.M., 2003.Construction Scheduling with Primavera Project Planner. *Cost Engineering*, *45*(10), p.24.
- Williams, D.L., 2012.Oracle primavera P6Version8: Project and portfolio management. Packt Publishing Ltd.
- Kelly, S.D., 2012.Oracle Primavera Contract Management BiVersion14.PacktPublishing Ltd.

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=c6GbkT10hZ8

Web Link

https://mindmajix.com/primavera-p6-tutorial

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Understand the Primavera software environment	L1
CO2	Develop project plan and assign calendars.	L6
CO3	Develop tasks and create work breakdown structure	L6
CO4	Create resources and modify it.	L6
CO5	Modify the project plan to reach the targets and create project baselines	L6

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	M	L	H	0	L	L	0
CO2	H	0	L	H	0	L	L	0
CO3	H	0	L	H	0	L	L	0
CO4	H	0	L	H	0	0	L	0
CO5	H	0	L	H	0	0	L	0

H – High , M – Medium, L - Low

II-SEMESTER (Elective 1)

INTERNATIONAL PROJECT MANAGEMENT			
Course Code	**22CPM271**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	00:02:00	Viva Marks	50
Total Hours of Pedagogy	28	Total Marks	100
Credits	02		

Course Learning objectives:

- To know the concepts of international project management and studying the process of evaluating A country's Risk.
- To familiarize about Time, cost, and scope in international projects.
- To familiarize about leadership in international projects.
- To give an overview about communication and staffing strategies.
- To know the methods to undertake stakeholder's analysis.

Module-1	
Introduction to International Project Management, Evaluating of Country Risk and its impact on Project Selection and Management	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-2	
Managing Time, Cost, Scope and Quality Benefits and Risk in International Projects	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-3	
Leadership of International Projects	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-4	
Managing, Communication and Controlling International Projects, Recruitment and Staffing of International Projects	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*
Module-5	

The Wider Context of Stakeholder Analysis in International Projects. Cross-Cultural teamwork and leadership team.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*

Assessment Details (CIE and Viva voce)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together..

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Semester End Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The viva-voce marks awarded for PEC (Professional elective course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.

4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

- Köster, K.,2009. International project management. Sage.
- Lientz, B.and Rea, K., 2012.International project management. Routledge.
- Grisham, T.W., 2009. International project management: Leadership in complex environments. John Wiley &Sons.
- Mohammed, U.K., Prabhakar, G.P. and White,G.,2008.Culture and conflict management style of

international project managers.InternationalJournalofBusinessManagement,3(5),pp.3-11.

- Czuchry, A.J. and Yasin, M.M., 2003. Managing the project management process. Industrial Management & Data Systems.

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=ZRaZVLRXctU

Web Link
https://www.henryharvin.com/blog/what-is-international-project-management/

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Describe about international project management and ways to evaluate a country's Risk	L1
CO2	To interpret the time, cost and quality of a project and identifying the potential risks	L2
CO3	Describe the leadership principles for international projects	L1
CO4	Explain the methodology to manage communication, recruitment and staffing for International projects.	L1
CO5	Describe about stakeholder analysis in international projects and leadership.	L1

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**M**	**L**	**0**	**0**	**0**	**L**	**L**
CO2	**H**	**O**	**L**	**M**	**0**	**0**	**L**	**L**
CO3	**H**	**M**	**0**	**L**	**0**	**0**	**L**	**L**
CO4	**H**	**M**	**0**	**L**	**0**	**0**	**L**	**L**
CO5	**H**	**M**	**L**	**L**	**L**	**0**	**L**	**L**

H – High , M – Medium, L - Low

II -SEMESTER (Elective 1)

MAINTENANCE AND REHABILITATION OF STRUCTURES			
Course Code	**22CPM272**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	00:02:00	Viva Marks	50
Total Hours of Pedagogy	28	Total Marks	100
Credits	02		

Course Learning objectives:

- To study the effects of climate, temperature, and chemicals on buildings.
- To know the importance and assessment procedures for maintaining the buildings.
- To study about materials and techniques to repair old buildings.
- To assess the structural defects due to fire, leakage and marine exposure.
- To assess strength and durability of concrete and know the quality control procedures.

Module-1

INFLUENCE ON SERVICEABILITY AND DURABILITY: Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*

Module-2

MAINTENANCE AND REPAIR STRATEGIES: Definitions: Maintenance, repair and rehabilitation, facets of maintenance importance of Maintenance Preventive measures on various aspects Inspection. Assessment procedure for evaluating a damaged structure causes of deterioration – testing techniques.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:** Power point presentation and webinars.*

Module-3

MATERIALS AND TECHNIQUES FOR REPAIR: Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and under pinning.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*

Module-4

EXAMPLES OF REPAIR TO STRUCTURES. Repairs to overcome low member strength, Deflection, Cracking, chemical disruption, weathering wear, fire, leakage, marine exposure. Engineered demolition techniques for Dilapidated structures – Case studies.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same* ***Blended learning:** Power point presentation and webinars.*
Module-5	
STRENGTH AND DURABILITY OF CONCRETE: Quality assurance for concrete–Strength, Durability- Cracks, different types, causes–Effects due to climate, temperature, Sustained elevated temperature, Corrosion. **SPECIAL CONCRETES:** Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self-compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.	
Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.* ***Blended learning:** Power point presentation and webinars.*

Assessment Details (both CIE and Viva voce)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 50% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The viva-voce marks awarded for PEC (Professional elective course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.

4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

- Denison Campbell, Alien and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991
- Allen R.T.and Edwards S.C., Repair of Concrete Structures, Blahie and Sons, UK,.1993
- Shetty M.S., Concrete Technology- Theory and Practice, Chand and Company, New Delhi, 2000
- Verghese P.C., Maintenance, Repair & Rehabilitation & Minor Works of Buildings, Prentice Hall, 2014
- Samuel Y. Harris, Building Pathology- Deterioration, Diagnostics and Intervention, John Wiley & sons, 2001

Web links and Video Lectures (e-Resources):

Video Tutorial
https://www.youtube.com/watch?v=x9noZ4xEXyg&list=PLNRGMg8U7bLdPXyqgUHSzjL58kH3urQN1

Web Link
https://www.constrofacilitator.com/repair-and-rehabilitation-of-structure/

Skill Development Activities Suggested

- Guest Lecture from expert.
- Attending webinars.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	Know the influence of climate on building and understand the methods to treat the defects occurring out of weathering actions.	L1
CO2	Summarize the maintenance and repair strategies for old and damaged buildings.	L2
CO3	Identify the materials and techniques required to intervene on a defective or damaged structure	L1
CO4	To describe the weathering actions on the structure.	L1
CO5	To summarize the quality assurance procedures for concrete structures and study Cause affects of damage arising due to climate, temperature, corrosion etc.	L2

Program Outcomes of the CPM Program:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	L	0	M	0	0	M	0
CO2	H	L	0	M	0	0	M	0
CO3	H	L	0	M	0	0	M	0
CO4	H	L	0	M	0	0	M	0
CO5	H	L	0	M	0	L	M	0

H – High , M – Medium, L - Low

III Semester

PROJECT RESOURCE MANAGEMENT - 2			
Course Code	22CPM31	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:0:02	SEE Marks	50
Total Hours of Pedagogy	32+32(SDA)	Total Marks	100
Credits	4	Exam Hours	3 Hrs

Course Learning objectives:

- Planning and procurement of various resources required in a project in an effective and efficient manner. Understanding the laws and regulation concerning with labours.

Module-1

RESOURCE PLANNING

Resource Planning, Procurement, Identification, Personnel, Planning for material, Labour, time schedule and cost control, Types of resources, manpower, Equipment, Material, Money, Time

Teaching-Learning Process	Direct method: *Lecture supported by conventional method of Blackboard and chalk to understand human resource and management of human resources. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*

Module-2

TIME AND COST MANAGEMENT

Personnel time, Management and planning, managing time on the project, forecasting the future, Critical path measuring the changes and their effects - Cash flow and cost control

Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work on case studies in a group to understand the management of personnel, productivity and the role of project manager.*

Module-3

LABOUR MANAGEMENT

Systems approach, Characteristics of resources, Utilization, measurement of actual resources required, Tools for measurement of resources, Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour.

Teaching-Learning Process	**ICT and digital support:** *Power point presentation to understand the existing labour laws.*

Module-4

INDUSTRIAL RELATIONS AND LABOUR LAWS

Labour legislation – nature and scope – Indian constitution and labour – labour laws for the building Industry – laws regulating wages and payments to workers – social security laws – industrial relations laws – miscellaneous laws- Industrial relations and trade unions.

Teaching-Learning Process	**Collaborative and Cooperative learning**: knowledge sharing through seminars and case studies.

Module-5

SITE ORGANIZATION

Types of site Organization – Functional, Divisional and matrix organization – Organization chart –Execution and monitoring. Mobilization of materials and equipment on site management- Work completion and finalization – completion of work and closing of site – Preparation of final bill – Reconciliation of materials – Plant and equipment utilization statement – List of defects –Demobilization of resources – Settlement of claim – Extension of time – Guidelines for site management.

Teaching-Learning Process	**ICT and digital support:** power point presentations to elaborate the site organisation, execution and monitoring. **Collaborative and Cooperative learning:** case studies and site visits to understand the site organisation in real time projects.

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:

Books

1. Carleton Counter II and Jill Justice Coutler, The Complete Standard Handbook of construction
2. Personnel Management, Prentice – Hall, Inc., New Jersey, 1989.
3. Memoria, C.B., Personnel Management, Himalaya Publishing Co., 1992.
4. Josy. J. Familaro, Handbook of Human Resources Administration, McGraw – Hill International Edition, 1987.
5. Pringle Charles, Management Longenecker Emerricle Publishing Company, 1981.
6. R.S. Dwivedi, Human Relations and Organizational Behaviour, BH – 1987.
7. Austen A D & Neale R H, Managing construction projects, Dialogue publication, 1985

Web links and Video Lectures (e-Resources):

- Resource Management: Process, Tools & Techniques (projectmanager.com)

Skill Development Activities Suggested

- Resource management (leveling) to be explored using software.
- Creating an organization breakdown structure to execute a project.

Course outcome (Course Skill Set):

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Illustrate the development, implementation, and evaluation of various resources of a construction project.	L3
CO2	Analyze the design and evaluation of time management program.	L4
CO3	Analyze the design and evaluation of labour management program.	L3
CO4	Interpret the rational design of compensation and labour laws.	L5
CO5	Develop the design and evaluation of the site organization and planning.	L3

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COs and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**M**	**H**	**H**	**M**	**L**	**0**	**0**	**H**
CO2	**H**	**L**	**M**	**L**	**L**	**L**	**M**	**H**
CO3	**H**	**H**	**0**	**H**	**M**	**H**	**M**	**H**
CO4	**H**	**H**	**0**	**H**	**L**	**L**	**M**	**H**
CO5	**H**	**H**	**H**	**M**	**M**	**H**	**M**	**H**

III Semester

BUILDING ENERGY ANALYSIS MANAGEMENT			
Course Code	22CPM32	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	32+32(SDA)	Total Marks	100
Credits	4	Exam Hours	3

Course Learning objectives:

- To introduce the need for energy management and energy audit in buildings.
- To achieve higher standards in building design and operation with a solid foundation of energy engineering and sustainability principles.
- To use building performance modelling as an investigative tool to improve overall energy efficiency of the building

Module-1

INTRODUCTION

Energy sources - energy demand and supply, energy crisis, future scenario, Alternate sources of energy - Energy system efficiency, energy conservation aspects, Principles of Energy management and Audit - General principles, planning and program - Introduction to Energy Audit -Types and Methodology, site surveys, energy systems survey, Instrumentation and measurement, analysis of data and results.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concept of energy sources and energy management. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*

Module-2

ENERGY AND BUILDING SERVICES

Thermal performance characteristics of building elements/enclosure; Energy efficiency in design and operation of building services; Energy audit in different types of buildings and Energy Management; Recycling and reuse of water products, Concepts of Green and Sustainable Buildings.

HVAC : HEATING AND COOLING MANAGEMENT

General principles of energy managements in HVAC systems; Energy management opportunities; Modelling of heating and cooling loads in buildings.

ELECTRICAL LOAD AND LIGHTING MANAGEMENT

General Principles; Illumination and human comfort; Lighting systems; Equipments; Energy management opportunities; Electrical load analysis; Peak load controls. Process energy Management: Principles; Modelling of electrical and lighting loads in buildings.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concept of HVAC and Electrical load and lighting management* ***ICT and Digital support**: Video to demonstrate the process of HVAC and Electrical load and lighting management. Power point presentation to elaborate Modelling of HVAC, electrical and lighting loads in buildings.*

Module-3

BUILDING INFORMATION MODELING (BIM)

Use of computers, building information management of energy with environment aspects - Building information modelling (BIM) - Facilitates documentation - design exploration - model-based quantity take off and estimating - interference checking - construction coordination and sequencing - digital fabrication and 3-D building information capture and visualization. - Examine geometry - spatial relationships - building information - quantities and properties of building components - Integrating people – systems - business structures and practices for maximizes efficiency through all phases of design – fabrication - construction and life cycle of the structure.

Teaching-Learning Process	***ICT and Digital support****: Video to demonstrate the BIM modelling .Power point presentation to elaborate Modelling of BIM.* ***Collaborative and Cooperative learning***: *Students should work on BIM model as group work. The research and learning to be share with the class.*
Module-4	

INTEGRATED BUILDING SYSTEMS General principles - environment conformation - Passive design considerations - integration of building system - energy storage - cold storage techniques - Economic analysis, economic aspects of energy management - Economic analysis methods - life-cycle costing - break even analysis - benefit cost analysis - payback period analysis - present worth analysis - equivalent annual cost analysis	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to introduce the concept of integrated building system* ***ICT and Digital support****: Video to demonstrate the process of integrated building system. Power point presentation to elaborate integrated building system.*
Module-5	
COMPREHENSIVE LEARNING Based on understanding of above Units the students are expected to perform various simulation analysis on Energy load, life cycle analysis etc., through BIM of a small project emphasizing on Energy efficiency design.	
Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work on BIM model as individual work. The research and learning to be share with the class.*

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:

Books

15. Clive Beggs. (2009). Energy: Management, Supply and Conservation, Routledge.
16. Douglas Harris. (2011). A Guide to Energy Management in Buildings, Routledge.
17. Koenigsberger, O.H, Ingersoll, T. G., Mayhew. A, Szokolay.S.V.(2004). Manual of Tropical Housing and Building Part 1
18. LalJayamaha. (2006). Energy-Efficient Building Systems: Green Strategies for Operation and Maintenance, McGraw-Hill Professional.
19. Steve Doty and Wayne C. Turner. (2012) Energy Management Handbook, Fairmont Press.
20. Tarik Al-Shemmeri (2011). Energy Audits: A Workbook for Energy Management in Buildings, Wiley.
21. W R Murphy, G Mckay. (1981). Energy Management, Butterworth-Heinemann Ltd.

Web links and Video Lectures (e-Resources):

NPTEL Lecture 12- Energy Efficiency and Stimulation :
http://www.digimat.in/nptel/courses/video/105107156/L12.html

NPTEL Lecture 16- Energy Efficiency, Acoustics and Day lighting in Buildings:
https://www.digimat.in/nptel/courses/video/105102175/L16.html

Skill Development Activities Suggested

- Guest Lecture from expert.
- Case Studies :
  1) The Energy and Resources Institute (TERI) – Bangalore
  2) Titan new corporate campus (GRIHA Rating: 5 Stars) – Bangalore
  3) Mahindra World City in Chennai, India (certified under certified under the Indian Green Building Council's (IGBC) Green Townships rating system.
  4) DLF Cyber city in Chennai – LEED Platinum certified project.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Interpret the understanding of energy sources, principles of energy management and energy auditing.	L2
CO2	Interpret the understanding of the thermal performance of buildings.	L2
CO3	Develop the knowledge to demonstrate an understanding of energy efficiency in design and operation of building services.	L3
CO4	Develop the model using energy simulation software tools and generate building energy information its performance.	L3
CO5	Develop an integrated building system approach to energy management using passive design techniques.	L3
CO6	Evaluate energy efficiency design through a simulation analysis approach.	L4

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COs and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**0**	**L**	**0**	**M**	**H**	**M**	**M**
CO2	**H**	**H**	**M**	**0**	**M**	**M**	**M**	**L**
CO3	**H**	**L**	**L**	**M**	**H**	**L**	**H**	**M**
CO4	**0**	**L**	**M**	**H**	**L**	**L**	**M**	**M**
CO5	**M**	**L**	**M**	**M**	**M**	**M**	**H**	**H**
CO6	**M**	**M**	**L**	**H**	**H**	**M**	**M**	**M**

H – High , M – Medium, L - Low

III Semester

FINANCIAL MANAGEMENT			
Course Code	22CPM33	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	32+32(SDA)	Total Marks	100
Credits	3:00	Exam Hours	3

Course Learning objectives:

- The objective of the course is to familiarize the fundamentals of financial management concepts and their applications in the various phases of the project cycle of construction projects.
- To provide a basic knowledge to carry out the financial feasibility of projects, selection of building systems and equipment's and evaluation of project investment decisions.

Module-1

PRINCIPLES OF FINANCIAL MANAGEMENT

Nature of finance management - objectives and principles - various financing decisions - Business firms and their financing - types of business units - capital sources and structures - marginal cost of capital - optimum capital structures.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concept of Principles Of Financial Management. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*

Module-2

BUDGETING AND ESTIMATION

Budget as management control techniques - requirement of a good budget - budget planning - budget process - cash budget - cash flow analysis - financial ratio analysis - interpretation and return on investment- Contract costing estimation of profit -Percentage completion method – completed contract method. Basis of accounting – accounting for tax reporting & financial reporting purposes. Method of recording - cash method, accrual method. Taxation on construction contract.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to explain Budgeting And Estimation.* , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.

Module-3

PROJECT EVALUATION

Evaluation of alternatives – present value method – rate of return method -time value of money – Net present value method, Profitability index and IRR method, Cost Volume benefit analysis - life cycle costing – structural cost – finishing cost – operating cost.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to explain about Project Evaluation. Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*

Module-4

PROJECT FINANCE

Stages of project finance management – method of recording – cash method, accrual method, percentage of completion method, completed contract method. Financing international projects – project cash flow – progress payments and expenditures risk in international contract – accounting and economic exposure – joint ventures and BOT projects.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to explain about Project Finance. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same.*

Module-5

CONSTRUCTION CLAIMS MANAGEMENT

Construction claims – classification of claims – claim forms – disputes and arbitration – contractual remedies – court cases – management of escalation – price escalation provisions – general methodology – critical analysis.

Teaching-Learning Process	***ICT and Digital support:*** *Power point presentation to explain about the* Construction *Claims Management.* ***Collaborative and Cooperative learning****: Selected topics to be given as seminar group work. The research and learning to share with the class.*

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full modules, selecting one full question from each module. Marks scored by the student will be scale downed to 50 Marks

Suggested Learning Resources:

Books

22. Andrew Ross, & Williams, P. (2012). Financial Management in Construction Contracting. Wiley & Blackwell,
23. Levinson, M. (2001). Guide to financial markets. London: Economist Profile Books.
24. Madura, J. (2008). Financial markets and institutions. Ohio: Thomson Publications.
25. Steven J. Peterson , (2012), Construction Accounting & Financial Management, Pearson, USA
26. Tenah, K. A., & Guevara, J. M. (1985). Fundamentals of Construction Management and organization, Brady Company.
27. Block. Stanley, B. and Geoffrey, A. (2001), Foundations of financial management. London: McGraw- Hill.
28. Chandra. P. (2008). Financial management -Theory of practice. New Delhi: Tata McGraw - Hill.
29. Damodaran, A. (2008). Corporate finance theory and practice. New Delhi.: Wiley India.
30. Khan. M. and Jain. P. (2008). Financial management. New Delhi. Tata McGraw-Hill,
31. Myers, B.. Allen, S. and Mohanty, P. (2010). Principles of corporate finance. New Delhi. Tata McGraw -Hill,
32. Pandey, 1. (2009). Financial management. New Delhi. Vikas Publishing House,
33. Van. Home, J. and Wachowicz, J. (2005). Fundamentals of Financial management. New Delhi. Pearson,
34. Vishwanath, S. (2007). Corporate Finance them and practice. Response Books, New Delhi
35. Steven J. Peterson , (2012), Construction Accounting & Financial Management, Pearson, USA

Web links and Video Lectures (e-Resources):

1. **NTPEL Lec-03 Basics of Financial Management - Part 1**
   https://youtu.be/Sx-dy96_tCQ
2. **NTPEL Lec-04 Basics of Financial Management - Part 2**
   https://youtu.be/FEGbjCrxjAA
3. **Mod-02 Lec-05 Basics of Financial Management - Part 3**
   https://youtu.be/S05LAOR4ur8

4. https://corporatefinanceinstitute.com/resources/knowledge/finance/internal-rate-return-irr/

Skill Development Activities Suggested

- Tally prime – accounting software
- Budgeted cost and actual cost comparison using software.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Interpret the applicability of the concept of Financial Management to understand the managerial Decisions and Optimum Capital Structure.	L2
CO2	Interpret the concepts of Budgeting And Estimation.	L2
CO3	Analyze the current changing economic conditions and be able to predict and estimate the future financial requirement.	L4
CO4	Recommend the best project proposal to invest	L5
CO5	Connect with international projects.	L4
CO6	Analyze construction claims and how risk is assessed.	L4

H – High , M – Medium, L - Low

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**M**	**M**	**-**	**-**	**L**	**L**	**-**	**M**
CO2	**M**	**M**	**H**	**H**	**L**	**L**	**L**	**M**
CO3	**H**	**M**	**-**	**M**	**L**	**M**	**H**	**H**
CO4	**H**	**H**	**L**	**M**	**H**	**H**	**H**	**M**
CO5	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO6	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**

III Semester

DISSERTATION PHASE- 1			
Course Code	22CPM34	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:01:00	Viva Marks	50
Total Hours of Pedagogy	48	Total marks	100
Credits	3	Exam hours	---

Course Learning objectives:

- The objective of the dissertation is to provide an opportunity to the students to prepare independent and original study of a special project of his/her own choice.
- The project provides students an opportunity for academic research to cultivate specialization in the areas of their own interest under the overall guidance of the faculty.
- The objective of the seminar work is to train the students to prepare state of art report by assimilation of concepts / ideas on a chosen topic in the area of Building Engineering and Management.

COURSE CONTENT

Dissertation Stage-1: Students in consultation with the guide/s shall carry out literature survey/ visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis and narrate the methodology to carry out the project work.

Students in consultation with the guide/co-guide if any, shall pursue literature survey and complete the preliminary requirements of selected Project work. Each student shall prepare relevant introductory project document, and present a seminar

Seminar:

Each student, under the guidance of a faculty, is required to

- Present the seminar on the selected project orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit two copies of the typed report with a list of references.

The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Teaching-Learning Process	1. Guest lectures, webinars, site visits to acquire subject knowledge related to the selected topic. 2. Critical review with constructive suggestions / feed backs has to be provided by the Guide/ co-guide during the progress of the dissertation.

Assessment Details (both CIE and viva-voce):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for Dissertation Stage -1, shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the synopsis of the Dissertation topic finalized.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for Dissertation Stage -I, shall be based on the evaluation of synopsis submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
3. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

36. Ranjith Kumar (2005.) Research Methodology- A step by step guide for beginners, California: Sage Publications.
37. John W Creswell, (2002). Research design: Qualitative, Quantitative and Mixed method approaches. California: Sage Publications.
38. Kate Turabian. (2018) A Manual for Writers of Research Papers, Theses, and Dissertations. Chicago: Chicago Guides to Writing, Editing, and Publishing.

Web links and Video Lectures (e-Resources):

- Thesis Format | Dissertation Format | Paper, Structure, Sample | Leverage Edu

Skill Development Activities Suggested

- Guest lecture
- Review of research papers
- Site visits

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
CO1	summarize an extensive literature study and data collection from the field and presentation in the form of drawings, relevant details/codes, schematic charts, reports and photographs	L5
CO2	Propose problem identification, formulation, and solution.	L6
CO3	Develop a sound technical knowledge of their selected project topic.	L3
CO4	Design engineering solutions to complex problems utilising a systems approach.	L6

Program Outcome of this course :

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COs and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**H**
CO2	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**
CO3	**H**	**M**	**H**	**H**	**H**	**M**	**M**	**H**
CO4	**H**	**H**	**L**	**L**	**M**	**M**	**H**	**H**

H – High , M – Medium, L - Low

III Semester

PROJECT FORMULATION AND APPRAISAL			
Course Code	22CPM35	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:00:00	Viva Marks	50
Total Hours of Pedagogy	48	Total Marks	100
Credits	3	Exam Hours	Nil

Course Learning objectives:

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

Module-1

Project Formulation

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

Teaching-Learning Process	**ICT and digital support**: Power point presentations to analyze the market trend and investments as per the public demand. Sample project clearance report – Environmental clearance, CRZ etc.

Module-2

Project Costing & Appraisal

Project Cash Flows – Time Value of Money – Cost of Capital. NPV – BCR – IRR – ARR – Urgency – Pay Back Period – Assessment of Various Methods – Indian Practice of Investment Appraisal – International Practice of Appraisal – Analysis of Risk – Different Methods – Selection of a Project and Risk Analysis in Practice

Teaching-Learning Process	**Direct method:** *Lecture supported by conventional method of Blackboard and chalk to introduce the concept of NPV, BCR, IRR and ARR.*

Module-3

Project Financing

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

Teaching-Learning Process	**ICT and digital support**: Power point presentations to explain the concepts of project finance and available schemes.

Module-4

Private Sector Participation

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

Teaching-Learning Process	**Collaborative method:** Case studies of various infrastructure project to understand the type of the project and dealing with projects having foreign collaboration.

Module-5

Report

Students must study and submit a Journal review/ Net study/ live study on any of the topics outlined in the syllabus

Teaching-Learning Process	**Collaborative method:** Students can work in groups to submit journal review.

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.

2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.

3. The viva-voce marks awarded for Dissertation Stage -I, shall be based on the evaluation of synopsis submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.

3. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

39. Barcus, S.W. and Wilkinson.J.W., "Hand Book of Management Consulting Services", McGraw Hill, New York, 1986.
40. Joy P.K., "Total Project Management - The Indian Context", New Delhi, Macmillan India Ltd., 1992
41. Prasanna Chandra, "Projects – Planning, Analysis, Selection, Implementation Review", McGraw Hill Publishing Company Ltd., New Delhi. 2006.
42. "United Nations Industrial Development Organization (UNIDO) Manual" for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987.
43. Harold Kerzner (2013), Project Management: A Systems Approach to Planning, Scheduling, and Controlling , Wiley India, New Delhi
44. Mohamed Hegab (2014), Public Private Partnerships for Highway Projects: Project Selection and Decision Analysis, Create space Independent Publisher, USA.
45. Jeffery delmon (2016), Private Sector Investment in Infrastructure: Project Finance, PPP Projects and PPP Frameworks, Kluwer Law International.

Web links and Video Lectures (e-Resources):

1. NPTEL LECTURE: Project appraisal
https://youtu.be/IOn-erkINAo
https://youtu.be/2Ow8JUgRC1Q
2. NPTEL LECTURE: Project Finance
https://youtu.be/KCoytFTpHdk

Skill Development Activities Suggested

- Prepare detailed case study about different metros, highways, high rise buildings, Port construction etc., related to infrastructure development.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Illustrate the process of various feasibility studies required for project formulation	L4
CO2	Describe the project cash flows and concepts of time value of money	L2
CO3	Appraise the selection of projects through payback period calculations	L4
CO4	Identify the PPP model and understand the stakeholders and their roles	L2

Program outcome of the course

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**L**	**L**	**L**	**H**	**H**	**M**	**H**
CO2	**H**	**M**	**L**	**H**	**H**	**M**	**M**	**M**
CO3	**H**	**L**	**L**	**H**	**H**	**H**	**M**	**M**
CO4	**H**	**H**	**L**	**M**	**H**	**H**	**M**	**H**

H – High , M – Medium, L - Low

III Semester(Elective II)

<table>
<tr><td colspan="4">PROFESSIONAL ELECTIVE:
Airport Planning and Design</td></tr>
<tr><td>Course Code</td><td>22 CPM 361</td><td>CIE Marks</td><td>50</td></tr>
<tr><td>Teaching Hours/Week (L:S:SDA)</td><td>2:0:0</td><td>Viva Marks</td><td>50</td></tr>
<tr><td>Credits</td><td>02</td><td>Exam Hours</td><td>--</td></tr>
<tr><td colspan="4">Module -1</td></tr>
<tr><td colspan="4">Course Learning objectives:
At the end of the course the student will be able to:
Understand the concept of infrastructure Management with respect Airports</td></tr>
<tr><td colspan="4">Introduction: Airports, stolports, Heliports, Aircraft components which affects planning and design of airports</td></tr>
<tr><td colspan="2">Teaching-Learning Process</td><td colspan="2">Direct method: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same
Blended learning: Power point presentation and webinars.</td></tr>
<tr><td colspan="4">Module -2</td></tr>
<tr><td colspan="4">Airport components: Terminal building, apron area, Taxi-way, High speed exit, Run -way, Holding apron and hanger, Number of runway, runway orientation, parallel runway and other runway configurations, Air Traffic control (ATC),Gate positions, Special requirements for international services like security check, Immigration area, passport control, customs control and other features. Domestic Airports and its requirements.</td></tr>
<tr><td colspan="2">Teaching-Learning Process</td><td colspan="2">Direct method: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same
ICT and Digital support: : Power point presentation to elaborate more on key topics.</td></tr>
<tr><td colspan="4">Module -3</td></tr>
</table>

Airport planning: Master plan, reginal planning ,Selection of site, Survey and drawings to be prepared (including future expansion and suitable land acquisition), Demand for future air traffic growth and planning (Passenger and cargo)	
Teaching-Learning Process	**Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same **Blended learning:** Power point presentation and webinars.
Module -4	
Wind Rose Diagram: Direction and orientation of runway based on wind direction, duration, intensity, runway numbering and plotting wind rose diagram.	
Teaching-Learning Process	**Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same **Blended learning:** Power point presentation and webinars.
Module -5	
Runway Design: Basic runway length, correction to elevation, gradient and temperature to obtain total runway length and problems, Airport classification, Taxiway Design: Taxiway radius, taxiway width and exit taxiway principle. Airport control: Airport lighting, Marking and Air Traffic Control(ATC)	
Teaching-Learning Process	**Direct method**: Lecture supported by conventional method of Blackboard and chalk to introduce the concepts **Collaborative and Cooperative learning**: Students should work on as individual work. The research and learning to be share with the class.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour 30 min)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 13th week of the semester.

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester

5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks(duration 01 hours)

6. At the end of the 13th week of the semester, the sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks.

Note:

The above topics shall be supplemented with site visits to marquee projects with in and outs side the country.

Reference:

1. Airport planning and design – S K Khanna, MG Arora and SS Jain
2. Planning and design – Horonjeff
   ICAO Practices and provisions and AAI standards

III Semester (Elective-II)

<table>
<tr><th colspan="4">INFRASTRUCTURE MANAGEMENT- TUNNELLING MARINE/OFFSHORE CONSTRUCTION</th></tr>
<tr><td>Course Code</td><td>22CPM362</td><td>CIE Marks</td><td>50</td></tr>
<tr><td>Teaching Hours/Week (L:P:SDA)</td><td>2:00:00</td><td>Viva Marks</td><td>50</td></tr>
<tr><td>Total Hours of Pedagogy</td><td>32</td><td>Total Marks</td><td>100</td></tr>
<tr><td>Credits</td><td>2</td><td>Exam Hours</td><td>---</td></tr>
<tr><td colspan="4">Course Learning objectives:
At the end of the course the student will be able to:
• Understand the concept of infrastructure Management with respect Tunnelling, Marine/ Offshore, Road and Highway infrastructure management.</td></tr>
<tr><td colspan="4">Module-1</td></tr>
<tr><td colspan="4">Introduction to Infrastructure Management and its processes. Types of Infrastructure Management: Tunnelling, Marine/ Offshore, Roads and Highways. Difference between Infrastructure Management and Construction Management</td></tr>
<tr><td>Teaching-Learning Process</td><td colspan="3">ICT and Digital support: PowerPoint presentations and videos to understand the infrastructure management and process.</td></tr>
<tr><td colspan="4">Module-2</td></tr>
<tr><td colspan="4">Land Sourcing and its Processes for Infrastructure Projects.</td></tr>
<tr><td>Teaching-Learning Process</td><td colspan="3">ICT and Digital support: PowerPoint presentations and videos to understand the land sourcing process.</td></tr>
<tr><td colspan="4">Module-3</td></tr>
<tr><td colspan="4">Investment and Financing for Infrastructure Projects. Viability Gap Funding, JV-PPP, Swiss-Challenge Model, etc.</td></tr>
<tr><td>Teaching-Learning Process</td><td colspan="3">Collaborative and Cooperative learning: Group assignments and case studies to be presented to learn the types of financing for infrastructure projects.</td></tr>
<tr><td colspan="4">Module-4</td></tr>
<tr><td colspan="4">Project Planning and Control for Infrastructure Projects.</td></tr>
<tr><td>Teaching-Learning Process</td><td colspan="3">ICT and Digital support: Project scheduling using software</td></tr>
<tr><td colspan="4">Module-5</td></tr>
<tr><td colspan="4">Site Safety& Traffic Management for Infrastructure Projects. Labour, Material & Movement scheduling.</td></tr>
<tr><td>Teaching-Learning Process</td><td colspan="3">ICT and Digital support: Labour and material management with the help of software.</td></tr>
</table>

ASSESSMENT DETAILS (BOTH CIE AND VIVA-VOCE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for PEC (Professional elective course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

- Das, P.C. ed., 1999. Management of highway structures. Thomas Telford.
- Adetola, A. and Goulding, J., 2016. Collaborative framework for road infrastructure management. Infrastructure Asset Management, 3(2), pp.71-80.
- Kazda, A. and Caves, R.E., 2007. Airport design and operation. Amsterdam: Elsevier.
- Kapur, A., 1995. Airport infrastructure: The emerging role of the private sector. The World Bank.
- Frangopol, D. and Tsompanakis, Y. eds., 2014. Maintenance and safety of aging infrastructure: Structures and infrastructures book series (Vol. 10). CRC press.
- Beulen, E., Van Fenema, P. and Currie, W., 2005. From application outsourcing to infrastructure management: Extending the offshore outsourcing service portfolio. European Management Journal, 23(2), pp.133-144.

Web links and Video Lectures (e-Resources):

NTPEL lecture on infrastructure management:
https://youtu.be/W3yOD_XM5-4
Stanford Webinar: Infrastructure Project Finance
https://youtu.be/Qwsi3qln1pE

Skill Development Activities Suggested

- Guest lectures
- Case studies of live infrastructure projects
- Webinars / seminars on infrastructure management

Course outcome (Course Skill Set):

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the concept of infrastructure management	L2
CO2	Distinguish difference between infrastructure and construction management	L2
CO3	Develop the process for land sourcing	L3
CO4	Determine the financing methods for infrastructure projects	L3
CO5	Develop the traffic management plan for the implementation of infrastructure construction	L3
CO6	Estimate and develop a detailed schedule to manage labour and material movement	L5

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**H**	**L**	**M**	**H**	**H**	**M**	**H**
CO2	**H**	**H**	**M**	**M**	**M**	**H**	**H**	**H**
CO3	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO4	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO5	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**
CO6	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**

H – High , M – Medium, L - Low

III Semester (Elective-II)

VALUE ENGINEERING IN CONSTRUCTION MANAGEMENT			
Course Code	22CPM363	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:00:00	Viva Marks	50
Total Hours of Pedagogy	32	Total Marks	100
Credits	2	Exam Hours	---

Course Learning objectives:

- The student will understand the role of VE in construction. Classical VE principles will be emphasized and practical applications for construction managers, contractors, and other construction functions will be described.

Module-1

VALUE ENGINEERING

Definition, Importance to Contractors, Potential VE Applications Value: basic and secondary functions, factor contributing to value such as aesthetic, ergonomic, technical, economic: identifying reasons or unnecessary costs

Teaching-Learning Process	***ICT and Digital support****: Videos and PPt's to understand the basic concepts of value engineering.*

Module-2

VALUE ANALYSIS

10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation, follow, up action, benefits of value analysis, various applications; assessing effectiveness of value analysis.

Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work in a group to understand value analysis through case studies.*

Module-3

LIFE CYCLE COSTING

Life cycle costing – Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis. Different methods of performing value engineering.

Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work in a group to understand life cycle costing through case studies.*

Module-4

VE METHODOLOGY

Orientation phase, Information phase, Function Analysis phase, Creative Phase, Evaluation Phase, Development Phase, Presentation Phase, implementation Phase.

Teaching-Learning Process	***ICT and Digital support****: Videos and ppts to explain the various phase involved in the methodology of VE.*

Module-5

APPLICATION OF VALUE ENGINEERING TO A CONSTRUCTION PROJECT

VE during the Planning Phase of a Construction Project, VE during the Design Phase of a Construction Project, VE during the Construction Phase of a Construction Project

Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work in a group to apply value engineering at the different phase of construction.*

ASSESSMENT DETAILS (BOTH CIE AND VIVA-VOCE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for PEC (Professional elective course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

Value Engineering: Analysis and Methodology by Del Younke.

Web links and Video Lectures (e-Resources):

1. **NPTEL Lecture 07: Value Engineering Concepts**
https://youtu.be/mJoaZ4GewyI

2. https://www.gordian.com/resources/value-engineering-for-construction/

Skill Development Activities Suggested

- Guest lectures
- Learning VE by applying tit to real time live projects at every stage of construction.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Illustrate the concepts of value engineering, identify the advantages, applications	L4
CO2	Discuss various phases of value engineering. Analyze the function, approach of function and evaluation of function. Determine the worth and value.	L2
CO3	Apply VE to construction company business and industry technical situations	L3
CO4	Appraise the value engineering operation in maintenance and repair activities	L4
CO5	Develop the value engineering team and discuss the value engineering case studies.	L3

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**M**	**M**	**L**	**M**	**H**	**H**	**H**
CO2	**H**	**M**	**M**	**L**	**H**	**H**	**M**	**H**
CO3	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**
CO4	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**
CO5	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**H**

H – High , M – Medium, L - Low

III Semester (ElectiveII)

DISASTER MANAGEMENT			
Course Code	22CPM364	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:00	VIVA Marks	50
Total Hours of Pedagogy	32	Total Marks	100
Credits	2	Exam hours	---

Course Learning objectives:

- To understand the disasters and their impacts over the built environments and the recovery policy and frameworks.
- To impart knowledge of identifying improved disaster resilience opportunities using project management approach.
- To familiarize the students with various disaster recovery planning and reconstruction activities.

Module-1

INTRODUCTION

Introduction – types of disaster – geological disasters, hydro meteorological disasters, biological disasters, technological disasters, manmade disasters, global disasters; relationship between disaster and redevelopment; rehabilitation and reconstruction; Role of project management in disaster planning and reconstruction projects; method, tools, processes, practices and knowledge areas in managing disaster recovery and reconstruction.

Teaching-Learning Process	***Direct method:*** *Lecture supported by conventional method of Blackboard and chalk to introduce the concept.*

Module-2

DISASTER RECOVERY AND RECONSTRUCTION FRAMEWORK

Case studies of management of large scale disaster projects; experiences and lessons learnt; factors affecting success / failure of disaster planning and management; measurement of performance of disaster recovery projects; Governance and organisation of disaster planning and recovery; multiple stakeholder management and coordination; professionalism and ethics of disaster planning and reconstruction; disaster planning and reconstruction policies and standards; innovative and participatory approach to disaster management.

Teaching-Learning Process	***Direct method:*** *Lecture supported by conventional method of Blackboard and chalk to introduce the concept.* ***ICT and Digital support:*** *Video and Power point presentation to elaborate the disaster recovery and reconstruction framework.*

Module-3

POST DISASTER DAMAGE AND ASSESSMENT

Disaster damage and need assessment – effects and impacts of disaster – damage and loss assessment (DALA) – Human recovery needs assessments (HRNA)-Summary of assessment process – Post disaster need assessment deliverables – Issues and challenges in PDNA – Involvement of government in assessment process – Mega disasters of India and lessons learnt disaster management act -2005; National guidelines and plans on disaster management; role of government (local, state and national), role of non-government and inter – governmental agencies.

Teaching-Learning Process	***ICT and Digital support:*** *Video and power point presentation to explain about the post disaster damage and assessment.*

Module-4

RECOVERY AND RECONSTRUCTION PLANNING

Recovery planning – Policy – Key points to be considered for recovery policy – Basic structure of recovery and reconstruction plan – key areas of recovery and reconstruction planning – Issues and challenges in livelihood recovery Community safety and disaster resilience; predicting disasters, and appropriate response management; risk management in disaster planning and reconstruction; identification of risks; role of Geo-informatics, land use planning and development regulations, disaster safe designs; structural and non-structural mitigation of disasters.

Teaching-Learning Process	***ICT and Digital support:*** *Video and power point presentation to explain about the Recovery And Reconstruction Planning* ***Collaborative and Cooperative learning****: Selected topics to be given as seminar Group work. The research and learning to share with the class.*

Module-5

CONSTRUCTIVE ASSESSMENTS

Identifying and analysing the case studies of disaster, and do the study on the type of disaster and damage assessment basis the impact. Propose and justify the suitable recovery and resilient reconstruction planning for the particular development. Also identify and justify the project management approach suitable for such recovery and reconstruction planning.

Teaching-Learning Process	***Collaborative and Cooperative learning****: Selected topics to be given as seminar/group work and the research and learning to be shared with the class.*

ASSESSMENT DETAILS (BOTH CIE AND VIVA-VOCE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for PEC (Professional elective course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books:

46. W.Nick Carter, Disaster Management, A disaster manager's handbook, 2008.
47. S. Vaidyanathan, an Introduction to disaster management, natural disasters and manmade hazards, ikon books, New Delhi, 2011.
48. Harsh K.Gupta, Disaster Management, universities press 2003.
49. Damon P.Coppola, Introduction to International disaster management, Elsevier Inc, 2011
50. Palanivel K, Saravanavel J, Gunasekaran S, Disaster Management, Allied Publishers Pvt.Ltd, 2015
51. Dr.ParagDiwan (Ed), A manual on disaster management, Pentagon Press, New Delhi, 2010

Web links and Video Lectures (e-Resources):

- http://www.ndmaindia.nic.com
- http://www.nidm.gov.in

Skill Development Activities Suggested

- Disaster preparedness, response, recovery and mitigation for a specific type of disaster.
- Exploring on temporary structures for rehabilitation.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Interpret the Understanding of the various types of disasters and their impact over the built environment and society.	L2
CO2	Analyze the impact of the disaster and their damages and understanding of suitable disaster recovery framework	L4
CO3	Categorize the type of post disaster damages and understand the possible resilient reconstruction strategies	L4
CO4	Surveying the factors influencing the proper implementation of reconstruction planning	L4
CO5	Analyze the stakeholders involved and their role in implementing the reconstruction.	L4
CO6	Analyze the major case studies and their resilient planning and reconstruction strategies implemented	L4

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COs and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	L	M	L	H	H	H	H
CO2	H	H	H	H	M	H	H	M
CO3	M	H	H	H	H	H	H	H
CO4	H	H	H	M	M	L	M	H
CO5	L	M	L	L	H	H	L	H
CO6	M	-	L	L	H	H	-	M

H – High , M – Medium, L - Low

III Semester (Elective II)

RISK AND SAFETY MANAGEMENT			
Course Code	22CPM365	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:00:00	Viva Marks	50
Total Hours of Pedagogy	32	Total Marks	100
Credits	2	Exam Hours	---

Course Learning objectives:

- To outline the planning procedure involved in project risk assessment and mitigation
- To explain the risk implications and impact on various parameters involved in project risk management.
- To explain the procedures to be followed on the project safety planning, monitoring, controlling.

Module-1

INTRODUCTION TO RISK MANAGEMENT

Definitions of risk - Elements of risk management - Causes of risk - Components of risk management - Planning for risk management – Project charter – Risk management policies, roles and responsibilities, examining stakeholder tolerance, risk management plan template – Revisiting the work breakdown structure - Risk management plan, creating the risk management plan / risk mitigation plan, risk analysis, tracking

Teaching-Learning Process	***Direct method:*** *Lecture supported by conventional method of Blackboard and chalk to understand the basic components of risk management. , Discussions, Debate, Industry interactions, and research paper/news paper reading and inferences from the same*

Module-2

RISK IDENTIFICATION, RESPONSE AND COMMUNICATION

Identifying risk, preparing for risk identification, risk categories, referring to historical information - Identifying the project risk – Reviewing project documents, brainstorming, the Delphi technique, analysing SWOT – diagrammatic techniques - Examining the results of risk identification, qualitative and quantitative risk analysis - Preparing for Risk response, creating risk response action, mitigation plan, results of risk response planning. Risk monitoring and control - Risk communication, informing public about risk and responding to expressed concerns, education – Insurance as a form of Risk Transfer; Assessing risk profile of project; Mapping stakeholders risk profile by applying risk Iceberg model/Theory; As Low as Reasonably Possible (ALARP) principle - Basic principles of Insurance; Mandatory Insurance at work, International risk policy in projects, Insurance at project level and site level, insurance from project life cycle perspective, claims and settlement process**.**

Teaching-Learning Process	***ICT and Digital support:*** *Power point presentations to explain the risk identification process, response and communication.* ***Blended learning:*** *Risk identification in live projects and preparing the probability matrix using software.*

Module-3

CONSTRUCTION ACCIDENTS AND SAFETY PROGRAMMES

Accidents and their causes - Human factors in construction safety - Cost of construction injuries - Occupational and Safety hazard assessment - Legal implications - Problem areas in construction safety - Elements of an Effective in safety programme - Job site safety assessment, safety meetings, safety incentives - OHSAS 18001:2007 occupational health and safety certification procedures for organisations

Teaching-Learning Process	***Collaborative and Cooperative learning***: Group assignments and case studies to be presented to discuss the various construction risks involved and safety programmes for same.

Module-4

SAFETY IN CONSTRUCTION SITES

Safety in construction contracts - Safety record keeping - Safety culture - Safe workers - Safety and first line supervisors, safety and middle managers, top management practices - Company activities and safety - Safety Personnel - Contractual obligation – Contractor's safety policies and procedures – Contractor's job safety plan - Project Coordination and Safety Procedures - Workers Compensation

Teaching-Learning Process	***Collaborative and Cooperative learning***: Knowledge sharing of students through seminars and presentations.

Module-5

CONSTRUCTIVE ASSIGNMENTS

Select a small / medium scale construction project, list the possible risks involved in the execution of project, list the mitigation activities, and list possible impact of the risk over the time / cost / quality of the project. For the same project students to list the various safety and precautionary measures to be taken for the execution of the project safely. Also list the various violations that tend to happen while insisting safety and mitigation strategies to be followed.

Teaching-Learning Process	***Collaborative and Cooperative learning***: Preparing a detailed report of risk assessment, response and mitigation for a live / hypothetical project.

ASSESSMENT DETAILS (BOTH CIE AND VIVA-VOCE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PEC (professional elective course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for PEC (Professional elective course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

1. Bruce Barkley, Project Risk Management (Project Management), McGraw-Hill Professional, 2004
2. John R. Schuyler, Risk and Decision Analysis in Projects (Cases in project and program management series), Project Management Institute, 2002
3. Chris Chapman and Stephen Ward, Project Risk Management: Processes, Techniques and Insights, Wiley, 2003
4. Dale F. Cooper, Stephen Grey, Geoffrey Raymond, and Phil Walker, Project Risk Management Guidelines: Managing Risk in Large Projects and Complex Procurements, Wiley, 2004
5. James B. Atkins and Grant A. Simpson, Managing Project Risk: Best Practices for Architects and Related

Professionals, Wiley, 2008
6. Richard J. Coble, Jimmie W. Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall, 2000
7. Hillson, David (2017). Managing Risk in Projects, Ashgate Publishing Group (Web Version)
8. Loosemore, M. (2006). Risk management in projects. Taylor & Francis, London

Web links and Video Lectures (e-Resources):

- Project risk management |PMP certification
  https://youtu.be/HyGb_eaT-U8
- Lecture 51: Occupational Health & Safety Management Systems(OH&SMS) and OHSAS 18001-Part I
  https://youtu.be/Rr-xFmErOTk

Skill Development Activities Suggested:

- Guest lectures
- Case studies of live projects
- Webinars / seminars on infrastructure management
- Certification course on site safety management

Course outcome (Course Skill Set):

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the components and policies involved in risk management	L2
CO2	Perform Critical analysis through quantitative and qualitative assessment.	L3
CO3	Outline the implications involved from start to end of project from identifying problem areas, concerns to required procedures to be followed	L4
CO4	Analyse various elements of an effective safety programme and contractual obligations	L3
CO5	Illustrate procedures, legal implications and practices currently followed in Projects.	L4
CO6	Evaluation of concepts and the tools necessary to assess, prioritise, and manage high-risk projects and tasks	L5

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	M	H	M	H	H	H	H
CO2	H	M	H	M	M	H	M	H
CO3	H	H	H	H	H	H	H	H
CO4	H	H	M	H	H	H	M	H
CO5	H	H	M	M	H	H	M	H
CO6	H	H	H	H	H	H	H	H

H – High , M – Medium, L - Low

III Semester

INTERNSHIP			
Course Code	22CPM37	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	---	VIVA Marks	50
Total Hours of Pedagogy	---	Total Marks	100
Credits	3	Exam Hours	---

Course Learning objectives:

- To undergo professional training in a project a management firm to get an on-site experience of handling services in under construction high rise projects.
- To utilize the forum to discuss key issues in the projects, keep track of the different scheduled activities and communicate with the stakeholders.
- To get an overall view of the contract administration.

COURSE CONTENT

A candidate has to undergo practical training for 30 working days(6 weeks) during the vacation time period between II and III semester in an approved Project management Organization reputed in property development or infrastructure and established not less than five years.

The organizations train the students in specialised core areas of Building Services / Management and assist the candidates in identifying the area of study for dissertation. During this period the student is advised to study the live projects of the concerned company / industry. The training internship is intended to provide students with practical insights into the world of real business of the construction industry. The Institute looks for meaningful and supervised work experience for the student. The final project report will comprise of an in-depth research and analysis of activities in the form of drawings & relevant details, schematic charts & reports, photographs, documentation of the project, comments, suggestions, etc. to appraise the efficiency in progress of work.

Teaching-Learning Process	***ICT and Digital support:*** *listening to webinars and other seminars online relevant to the topics identified.*

Internship assessment Details (both CIE and viva-voce):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva-voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva-voce examination taken together

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for internship shall be based on the weekly report and final internship report submission.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for internship shall be based on the evaluation of internship report, internship presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Web links and Video Lectures (e-Resources):

Skill Development Activities Suggested

- Site visits to understand the working procedure of activities on site.
- Preparing project schedule.
- Estimation and costing of projects.
- Certification courses by NTPEL.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Identify concepts or skills with access to leading experts with specialized knowledge and experience.	L3
CO2	Apply basic knowledge using an effective performance management system in managing technical projects effectively.	L3
CO3	Manage projects using a proven, effective performance measurement technique	L5
CO4	Analyse and recommend project decisions concerning scope, cost and schedule parameters faster, more effectively and more confidently.	L4
CO5	Plan schedules, budgets, workloads and human resources issues and delegate practically and fairly.	L5
CO6	Identify the pitfalls of project management by quickly tracing the potential project risks and mitigate them as early as possible.	L3

Program Outcome of this course :

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**H**	**H**	**H**	**M**	**M**	**H**	**H**
CO2	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**H**
CO3	**H**	**H**	**M**	**M**	**M**	**M**	**H**	**H**
CO4	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**
CO5	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**H**

H – High , M – Medium, L - Low

III Semester

REAL ESTATE MANAGEMENT			
Course Code	22CPM38	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:01:01	Viva Marks	50
Total Hours of Pedagogy	48+16(SDA)	Total marks	100
Credits	3	Exam hours	---

Course Learning objectives:

- To offer hands on experience that is vital to excel in the marketplace by understanding the principles and practices of real estate.
- To provide a comprehensive understanding about real estate practice, financial markets, legal aspects and marketing management.
- To formulate and appraise capital investments for developers for different types of projects and to be able to prepare DPRs.
- To acquire competence in managing real estate and infrastructure assets and interpretation of valuation methods.

Module-1

REAL ESTATE MARKET

Real Estate Scope; classification of real estate activities and peculiarities; Factors affecting real estate market; Role of Government in real estate market; Statutory provisions, Laws, rules, and regulation, land use controls in property development, registration And licensing requirements – Knowledge base for assessment and forecasting the Real Estate market – environmental issues related to Real Estate Transactions.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to understand the practices of real estate.*

Module-2

PARTICIPANTS AND STAKE HOLDERS

Role, Scope, working characteristics and principal functions of real estate participants and stakeholders; real estate consultants and their activities, role and responsibilities of property managers; Code of ethics for Real Estate participants; Good practices and managerial responsibilities.

Teaching-Learning Process	***Direct method**: Lecture supported by conventional method of Blackboard and chalk to understand the function and role and responsibility of various participants stakeholders.*

Module-3

REAL ESTATE DEVELOPMENT PRACTICE

Development control regulations; Zoning; Rent control Act; Building byelaws; Permissions; Changing land use; Real estate types; Location selection; relevant ownership flats/apartments act; Planning for single, mixed use, planned use, specialized Special Economic Zones (SEZ) projects; Choosing vendors, contract terms; Facilities mix management; Integrating environmental issues in development.

Teaching-Learning Process	***Collaborative and Cooperative learning**: Students should present seminars on assigned topics and share the knowledge of the current practices in the real estate field.*

Module-4

VALUATION AND ASSET MANAGEMENT OF PROPERTIES

Value, valuation and importance of Value, Appraisal/valuation cycle, Valuation principles and factors, Major Approaches to Valuation-Market approach, Cost approach and Income approach, Valuation techniques/methods Valuation for Contemporary Issues viz., Energy and Environment, Contemporary issues in valuation. Asset management strategy and objectives; Overview of asset management standards: British Standard Institution (BSI), Publicly Available Specification (PAS) 55.ISO 55000; Asset management policy, Deterioration modeling; Maintenance - objectives models and maintenance requirements determination; Life cycle costing; Economic life of asset; Replacement analysis; Decision tools for asset management; Prioritization and optimization; System reliability.

Teaching-Learning Process	**ICT and collaborative learning:** videos and ppt to teach the concepts of valuation. ***Collaborative and Cooperative learning***: case studies to understand the asset management, maintenance and deterioration modelling.

Module-5

CONSTRUCTIVE ASSIGNMENTS

Individual assignments on valuation, EIA, cash flow, project formulation, DPR and case study analysis.

Teaching-Learning Process	***Collaborative and Cooperative learning***: critical analysis of project formulation and DPR through case studies.

Assessment Details (both CIE and viva-voce):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for PSC (Professional supportive course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

1. Madura, J. (2008). Financial markets and institutions. Ohio: Thomson Publications.
2. Levinson, M. (2001). Guide to financial markets. London: Economist Profile Books.
3. Ishkin, F., Eakins, S. (2009). Financial markets and institutions. New Delhi.: Pearson Education,
4. Verma, J. (1997). Venture capital financing in India. New Delhi.: Response Books.
5. Kotler, P. and Armstrong, G. (2008). Principles of marketing. New Delhi.: Prentice-Hall of India.
6. Kotler, P. and Keller, K. (2009). Marketing Management. New Delhi: Prentice- Hall of India.
7. Porter, M. (1992). Competitive strategy. New York: Free Press.

Web links and Video Lectures (e-Resources):

- https://www.researchgate.net/publication/304580462_Management_of_Real_Estate_Principles_of_Real_Estate_Development_Management
- Real Estate Training Course - Online Video Lessons | Study.com
- 110105144.pdf - Google Drive

Skill Development Activities Suggested:

- Site visits
- Seminars by industry experts
- Certification courses by NPTEL

Course outcome (Course Skill Set):

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Summarize the scope of the existing real estate industry in the current business environment and to classify the various statutory and legal regulations applicable to real estate market.	L2
CO2	Determine the roles, responsibilities, rights and liabilities of different real estate stakeholders	L3
CO3	Discover the various documentation procedures for different real estate transactions, appraisals and valuation of properties.	L3
CO4	Apply quantitative methodology used in different transactions.	L3
CO5	Compute the project development process, compare the different sources of real estate funds and classify the risks.	L3
CO6	Formulate a real estate project by assessing its feasibility and evolving strategies for effective management.	L6

Program outcome of the course

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**H**
CO2	**H**	**H**	**M**	**M**	**H**	**H**	**H**	**H**
CO3	**H**	**H**	**M**	**M**	**H**	**H**	**H**	**H**
CO4	**H**	**M**	**M**	**H**	**H**	**M**	**M**	**H**
CO5	**H**	**H**	**M**	**H**	**H**	**H**	**M**	**H**
CO6	**H**	**H**	**M**	**H**	**M**	**M**	**H**	**H**

H – High , M – Medium, L - Low

IV Semester

DISSERTATION PHASE- 2 (THESIS)			
Course Code	22CPM41	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:12:12	Viva Marks	50
Total Hours of Pedagogy	224+192(SDA)	Total Marks	100
Credits	22	Exam hours	---

Course Learning objectives:

- The objective of the dissertation is to provide an opportunity to the students to prepare independent and original study of a special project of his/her own choice.
- The project provides students an opportunity for academic research to cultivate specialization in the areas of their own interest under the overall guidance of the faculty.
- The objective of the seminar work is to train the students to prepare state of art report by assimilation of concepts / ideas on a chosen topic in the area of Building Engineering and Management.

COURSE CONTENT

Research Content: The dissertation/ thesis is an individual research project that is a major piece of work undertaken by the students. It is a continuation of the Dissertation phase-1 of the previous semester. They are expected to select a topic on a live problem in the industry or a macro-issue having a bearing on performance of the real estate, construction or urban infrastructure industry. The topic should be researchable and involve scientific design of a study, collection and analysis. The aim is to prepare state of art report on the chosen topic and develop hypothesis to be tested through the research methodology designed for the purpose.
The thesis proposal should include an overview of the proposed plan of work, including the general scope of your project, your basic research questions, research methodology, and the overall significance of your study. In short, the proposal should explain what to study, how to study this topic, why this topic needs to be studied.

Thesis proposals are designed to

- Justify and plan (or contract for) a research project.
- Show how your project contributes to existing research.
- Demonstrate to your advisor and committee that you understand how to conduct discipline specific research within an acceptable time-frame.
- Recommend future study areas for research.

Research Process: Students are required to test their outcome proposals through various methods, including questionnaire surveys and case studies. Students must create an innovative insight on the specific issues.
Thesis work includes processes such as: Research area identification; hypothesis of research topic; literature sourcing and search; aim and objective definition; formulation of methodology; field study planning; survey data collection, analysis and result presentation; literature study; conceptual an empirical :compilation and inference drawing; research study validation through case studies, field application and simulation models; discussion of findings of research findings; study conclusion and recommendation formulations. The progress of the Thesis work is presented and discussed by the student periodically in the classroom environment and progress monitored continuously. This work develops the comprehension and presentation skills of the students. The students are provided guidance from the faculty to channelize their thoughts.

Area of Research: The subject for special study may be conceptual or practical but pertaining to Building Engineering and Management in areas like Building Engineering, Construction technology ,Structural systems , Energy efficient building materials & techniques , Construction project management, Time management, Cost management, Quality management, Safety management, Contract Administration, Design management, Construction financial management, Human resource management, Quantitative techniques, Energy management, Building services, Building management systems, Infrastructure services , Management information systems , Project planning and feasibility and Disaster management

Presentation: The dissertation Project shall be submitted in the form of drawings, project report, models, slides etc. Relevant details/codes, schematic charts, reports and photographs.

Teaching-Learning Process	• Guest lectures, webinars, site visits to acquire subject knowledge related to the selected topic. • Critical review with constructive suggestions / feed backs has to be provided by the Guide/ co-guide during the progress of the dissertation.

Assessment Details (both CIE and viva-voce):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for Dissertation Stage -2, shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the Dissertation report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by two external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for Dissertation Stage -2, shall be based on the evaluation of Dissertation report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
3. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

52. Ranjith Kumar (2005.) Research Methodology- A step by step guide for beginners, California: Sage Publications.
53. John W Creswell, (2002). Research design: Qualitative, Quantitative and Mixed method approaches. California: Sage Publications.
54. Kate Turabian. (2018) A Manual for Writers of Research Papers, Theses, and Dissertations. Chicago:Chicago Guides to Writing, Editing, and Publishing.

Web links and Video Lectures (e-Resources):

- Thesis Format | Dissertation Format | Paper, Structure, Sample | Leverage Edu

Skill Development Activities Suggested

- Guest lecture
- Review of research papers
- Workshops / seminars by industry experts
- Site visits / case studies

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Prepare an extensive literature study and data collection from the field and presentation in the form of drawings, relevant details/codes, schematic charts, reports and photographs	L3
CO2	Develop a hypothesis to be tested through the research methodology designed for the purpose with innovative insight on specific issues thereby undertaking academic research independently.	L3
CO3	Experiment with research processes.	L4
CO4	Propose areas for further research and development	L5

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO2	**H**	**M**	**H**	**H**	**H**	**M**	**H**	**H**
CO3	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO4	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**

H – High , M – Medium, L - Low

IV Semester

FACILITY MANAGEMENT			
Course Code	22CPM42	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	Viva Marks	50
Total Hours of Pedagogy	32+32(SDA)	Total Marks	100
Credits	3	Exam Hours	---

Course Learning objectives:

- To understand the need of Facility Management and its applications.
- To attain the knowledge in maintenance and service of building services.
- To achieve high performance of buildings and building services.

Module-1	
Facility management (FM) as part of Construction Management	
Teaching-Learning Process	***Direct method****: Lecture supported by conventional method of Blackboard and chalk to understand the importance of facility management.*

Module-2	
Role and administrative functions of Supervisors. Fire fighting - Basic requirement for the work fire fighting system, various components of the fire fighting system, maintenance required of the system, fire lighting in high-rise buildings, commercial / industrial complexes, public buildings, checklist for fire safety, fire fighting.	
Teaching-Learning Process	***Collaborative and Cooperative learning***: *Students should work on case studies of different building typologies and the extend of fire fighting services provide. The frequency of maintenance and services provided for the same.*

Module-3	
Lifts / elevators, escalators, permissions & procedures legal formalities for Elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.	
Teaching-Learning Process	***ICT and Digital support****: Video to demonstrate the planning and installation of lifts.* ***Collaborative and Cooperative learning***: case studies of lift installation, operation and maintenance.

Module-4	
Plumbing Services: Basics of Plumbing systems, Requirement of Plumbing works, Agency, Activity Flow chart for Plumbing work, Quality, checking of materials. Water Supply distribution system in high-rise buildings & other complexes, pumps and pumping mechanism, operation & maintenance of fittings & fixtures of w/s.Do's & Don'ts for water pipe networks. Modern Sewage Treatment Plants. Landscaping & Horticulture, Building maintenance management.	
Teaching-Learning Process	***ICT and Digital support****: Video and PPT's to explain the basics of plumbing and water distribution system.* ***Collaborative and Cooperative learning***: case studies of water treatment plants and maintenance.

Module-5	
Air - Conditioning and Heating: Flowcharts of air conditioning & heating. Centralized systems, monitoring working of the equipment, checklist of Inspection, Performance testing. Waterproofing, Damp proofing & Termite proofing. Working Procedure & stages of work of waterproofing for W.C., bathrooms. Terrace, Sloping roof, Basements, tanks.	
Teaching-Learning Process	***ICT and Digital support****: Video and PPT's to explain the concept of air- conditioning and heating. Working mechanism of centralized air conditioning system.* ***Collaborative and Cooperative learning:*** *case studies of centralized AC plant to understand the working mechanism and maintenance.* *Direct Method: Lecture supported by conventional method of Blackboard and chalk to explain the stages of waterproofing.*

ASSESSMENT DETAILS (BOTH CIE AND VIVA-VOCE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for viva-voce examination is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in viva voce examination is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and viva voce marks taken together.

Continuous Internal Evaluation:

CIE marks shall be awarded by a committee comprising of Principal/Dean, PG Course Coordinator/HOD and Guide/Co-guide of the department. The CIE marks awarded for PSC (professional supportive course), shall be based on the progress of the student throughout the semester, presentation skills in seminars and submission of the report.

Viva-voce Examination:

1. The student needs to submit his/her report done throughout the semester, including the data collection for the Viva examination, at least one day prior to the Viva examination to the PG course coordinator/HOD.
2. The Viva-voce will be evaluated by external examiners appointed by the University along with PG Course coordinator/ guide/ co-guide or an internal examiner.
3. The viva-voce marks awarded for PSC (Professional supportive course), shall be based on the evaluation of report submission, presentation skill and performance in Question-and-Answer session in the ratio 30:10:10.
4. The viva-voce marks list generated is to be signed by both internal and external examiners and submitted to VTU

Suggested Learning Resources:

Books

55. Jensen, P.A. and van der Voordt, T. eds., 2016. Facilities management and corporate real estate management as value drivers: how to manage and measure adding value. Taylor & Francis.
56. Rondeau, E.P., Brown, R.K. and Lapides, P.D., 2012. Facility management. John Wiley & Sons.
57. Roper, K. and Payant, R., 2014. The facility management handbook. Amacom.

Web links and Video Lectures (e-Resources):

- Lecture on facility management:
  https://youtu.be/ekFYSJGzBFo
- lift installation Process:
  https://youtu.be/JgKlR3SR1UI
- NPTEL Lecture: water distribution system
  https://youtu.be/5NzMt6PErYo

Skill Development Activities Suggested

- Site visits
- Seminars on building services by industry experts.
- Certification course offered by NTPEL

Course outcome (Course Skill Set):

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Determine the roles and responsibilities of a facility manager	L3
CO2	Illustrate the basic requirements for installation of fire fighting system and lifts.	L3
CO3	Apply the standard codes for planning and installation of services in buildings	L3
CO4	Experiment on the sewage treatment plants and the usage of treated water to cater to sustainable concept.	L4
CO5	Analyse the performance of air conditioning system.	L4
CO6	Develop the application of water proofing, damp proofing termite proofing.	L3

Program Outcome of this course:

Sl. No.	Description	POs
1	Acquire outstanding fundamental knowledge in the field of Construction Project Management.	PO1
2	Encompass the ability to work in collaboration with interdisciplinary teams.	PO2
3	Demonstrate creativity in the problem-solving process through professional quality graphic presentations and technical drawings.	PO3
4	Acquire outstanding knowledge & software skills for design, construction, resources management and scheduling & Monitoring of projects.	PO4
5	Understanding the diverse needs of values and systems of society and providing sustainable solutions.	PO5
6	Demonstrate design solutions that integrate contextual, social, economic, cultural, ethical, environmental concerns.	PO6
7	Ability to do independent/option-based research and exploration of advanced and emerging topics.	PO7
8	Appraise professional standards and ethical responsibilities as a team member.	PO8

Mapping of COS and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**M**	**H**	**H**	**M**	**H**	**H**	**H**	**H**
CO2	**H**	**H**	**H**	**M**	**M**	**M**	**H**	**M**
CO3	**H**	**M**	**H**	**H**	**M**	**M**	**M**	**H**
CO4	**H**	**M**	**H**	**L**	**M**	**H**	**M**	**H**
CO5	**L**	**M**	**H**	**M**	**M**	**M**	**M**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**

H – High , M – Medium, L - Low