Two -Year postgraduate Programme

Master of Technology

Construction Project Management

(Civil Department)

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Faculty of Engineering & Technology
Master of Technology in Civil Engineering

1. Vision of the Department

The vision of the Civil Engineering Program is to impart a quality engineering education and ascertain research services to mankind.

2. Mission of the Department

The mission of the Civil Engineering Department is to nurture the intellectual, professional, and personal development of our students in order to prepare and encourage them to be highly competent technocrats and responsible members of society.

3. Program Educational Objectives

The statements below indicate the career and professional achievements that the B. Tech Civil Engineering curriculum enables graduates to attain.

PEO 1	Pursue a successful career in engineering involving professional knowledge and skills for analysis, design, and solution of real-time engineering problems.
PEO 2	Excel in professional career with sound fundamental knowledge and pursue life-long learning including higher education and research.
PEO 3	To provide an environment for exploring the Research & Development attitude, to help the students in Research and Development field.

4. Program Learning Outcomes

Program Learning outcomes are statements conveying the intent of a program of study.

PLO 1	**Engineering knowledge:**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PLO 2	**Problem analysis:**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.
PLO 3	**Design/development of solutions:**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
PLO 4	**Conduct investigations of complex problems:**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PLO 5	**Modern tool usage:**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PLO 6	**The engineer and society:**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PLO 7	**Environment and sustainability:**	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PLO 8	**Ethics:**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PLO 9	**Individual and team work:**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PLO 10	**Communication:**	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PLO 11	**Project management and finance:**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PLO 12	**Life-long learning:**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

5. Program Specific Learning Outcomes

PSO 1	**Demand as per recent development**	To embark on a career as an entrepreneur as civil engineering project manager/consultant thereby playing a very important role in society.
PSO 2	**Codes for Designing**	Familiarity and ability to use Indian and International Codes/ Standards for design of multidisciplinary projects.
PSO 3	**Software skill**	Analytical and computer skills that enable students to process information under difficult situation and to appropriately apply methods, procedures and techniques to decision making.

PSO 4	**Presentation Skills**	To inculcate critical analysis and communication skills that enable, students to effectively present their views, both in writing or through oral presentations.

6. Credit Framework

Semester wise Credit distribution of the programme	
Semester-1	18
Semester-2	18
Semester-3	16
Semester-4	16
Total Credits:	**68**

Category wise Credit distribution of the programme	
Category	**Credit**
Major Core	27
Minor Stream	0
Multidisciplinary	03
Ability Enhancement Course	02
Skill Enhancement Courses	08
Value added Courses	0
Summer Internship	0
Research Project/Dissertation	28
Total Credits:	**68**

7. Program Curriculum

Semester 1						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203200101	Research Methodology & IPR	2	2	0	0
2	203216101	Project Management	4	3	0	1
3	203216102	Construction Techniques	4	3	0	1
4		AUDIT-1 (Compulsory Subjects :1)	Audit	2	0	0
5		Elective - 1 (Compulsory Subjects :1)	4	3	0	1
6		Elective - 2 (Compulsory Subjects :1)	4	4	0	0
		Total	**18**	**17**	**0**	**3**
AUDIT-1						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203200102	English for Research Paper Writing	Audit	2	0	0
2	203200103	Disaster Management	Audit	2	0	0
3	203200104	Sanskrit for Technical Knowledge	Audit	2	0	0
4	203200105	Value Education	Audit	2	0	0

Elective - 1						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203216131	Project Material Management	4	3	0	1
2	203216132	Construction Equipment Management	4	3	0	1
3	203216133	Advanced Construction Technologies	4	3	0	1
Elective - 2						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203216134	Quality and safety management in construction projects	4	4	0	0
2	203216135	HR in Construction Management	4	4	0	0
3	203216136	Advance construction materials	4	4	0	0
Semester 2						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
7	203216151	Seminar & Mini Project	2	0	4	0
8	203216152	Strategy Management	4	3	0	1
9	203216153	O.R. In Construction Management	4	3	0	1
10		AUDIT-2 (Compulsory Subjects :1)	Audit	0	0	2
11		Elective - 3 (Compulsory Subjects :1)	4	3	0	1
12		Elective - 4 (Compulsory Subjects :1)	4	4	0	0
		Total	**18**	**13**	**4**	**5**
AUDIT-2						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203200151	Constitution of India	Audit	0	0	2
2	203200152	Pedagogy Studies	Audit	0	0	2
3	203200153	Stress Management by Yoga	Audit	0	0	2
4	203200154	Personality Development through Life Enlightenment Skills	Audit	0	0	2
Elective - 3						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203216181	Probability And Statistics	4	3	0	1
2	203216182	Value Engineering	4	3	0	1
3	203216183	Resource Management	4	3	0	1
Elective - 4						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**

1	203216184	Construction Contract Management	4	4	-	-
2	203216185	Project Risk Management	4	4	-	-
3	203216186	Sustainable Smart Building	4	4	-	-
Semester 3						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
13	203216201	Phase - I Dissertation	10	0	20	0
14		Elective-5 (Compulsory Subjects :1)	3	3	0	0
15		Open Elective (Compulsory Subjects :1)	3	3	0	0
		Total	**16**	**6**	**20**	**0**
Elective – 5						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203216231	Project Economics	3	3	0	0
2	203216232	Disaster Management	3	3	0	0
3	203216233	Green manufacturing	3	3	0	0
Open Elective						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	203200201	Business Analytics	3	3	0	0
2	203200202	Industrial Safety	3	3	0	0
3	203200203	Operation Research	3	3	0	0
4	203200204	Cost Management of Engineering Projects	3	3	0	0
5	203200205	Composite Materials	3	3	0	0
6	203200206	Waste to Energy	3	3	0	0
Semester 4						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
16		Phase II Dissertation	16	0	32	0
		Total	**16**	**0**	**32**	**0**

8. Detailed Syllabus

Semester 1

a. **Course Name:** Research Methodology & IPR
b. **Course Code:** 203200101
c. **Prerequisite:** Knowledge of Electronics and Communication Systems and Technologies. Basic Computer Skills Fundamental Knowledge of Area of Interest in relevant discipline.
d. **Rationale:** Students will learn to develop research skills
e. **Course Learning Objective:**

CLOBJ 1	Students will be able to design and implement effective research studies using appropriate methodologies, including qualitative, quantitative, and mixed methods. They will learn to formulate research questions, design experiments or surveys, and apply suitable data collection and analysis techniques.
CLOBJ 2	Students will understand and apply ethical standards in research, including principles related to informed consent, confidentiality, and the responsible use of data. They will learn to address ethical considerations throughout the research process.
CLOBJ 3	Students will gain knowledge of key intellectual property concepts, including patents, copyrights, trademarks, and trade secrets. They will learn how to apply these concepts to protect their own innovations and respect the intellectual property of others.
CLOBJ 4	Students will develop the ability to clearly and effectively communicate research findings and intellectual property concepts through written reports, presentations, and discussions. This includes articulating the significance of research outcomes and understanding the implications of IPR in a professional context.

f. **Course Learning Outcomes:**

CLO 1	Understand research problem formulation.
CLO 2	Analyse research related information
CLO 3	Follow research ethics
CLO 4	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CLO 5	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

CLO 6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	-	2	20	20	-	60	-	100

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Unit 1** Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.	**20%**	**5**
2	**Unit 2** Effective literature studies approaches, analysis Plagiarism, Research ethics.	**15%**	**5**
3	**Unit 3** Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	**15%**	**5**
4	**Unit 4** Nature of Intellectual Property: Patents, Designs, Trademarks and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	**20%**	**5**
5	**Unit 5**	**15%**	**5**

	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.		
6	**Unit 6** New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs..	**15%**	**5**

i. Text Book and Reference Book:

1. Intellectual Property Rights Under WTO by T. Ramappa | S. Chand, 2008
2. Research methodology: an introduction for science & engineering students By Stuart Melville and Wayne Goddard | Juta & Co Ltd
3. Research Methodology: An Introduction by Wayne Goddard, Stuart Melville | Juta and Company Ltd, 2004
4. Research Methodology: A Step by Step Guide for Beginners by Ranjit Kumar
5. Resisting Intellectual Property by Halbert | Taylor & Francis Ltd., 2007
6. Industrial Design by Mayall | McGraw Hill, 1992
7. Product Design by Niebel | McGraw Hill, 1974
8. Introduction to Design by Asimov | Prentice Hall, 1962
9. Intellectual Property in New Technological Age by Robert P. Merges, Peter S. Menell, and Mark A. Lemley | 2016

a. **Course Name:** Project Management
b. **Course Code:** 203216101
c. **Prerequisite:** Knowledge of Construction Planning Management
d. **Rationale:** To impart knowledge of parameters of construction projects. To learn management tools & techniques for planning, scheduling, organizing, controlling and monitoring of construction projects
e. **Course Learning Objective:**

CLOBJ 1	Students will be able to create detailed project plans that include defining project scope, setting objectives, and developing schedules and budgets. They will learn to use project management tools and techniques to ensure that projects are well-organized and aligned with stakeholders' expectations.
CLOBJ 2	Students will acquire skills to effectively execute project plans, manage resources, and monitor project progress. They will learn how to identify and address issues, risks, and changes to ensure that projects are completed on time, within scope, and within budget.
CLOBJ 3	Students will understand and apply various project management frameworks and methodologies, such as Agile, Waterfall. They will learn how to choose and implement the appropriate methodology based on project requirements and organizational context.
CLOBJ 4	Students will develop skills to lead and motivate project teams, manage stakeholder relationships, and facilitate effective communication. They will learn to address conflicts, ensure clear communication, and foster collaboration to achieve project goals and maintain team cohesion.

f. **Course Learning Outcomes:**

CLO 1	Prepare work break down plan and estimate resources requirements.
CLO 2	(ii) Solve problems of resource allocation and leveling using network diagrams. (iii) Plan and develop management solutions to construction projects.
CLO 3	Understand the principles of project management, resource management and inventory.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**BASICS OF PROJECT MANAGEMENT** Types of project, Phase of project, project management and its relevance, stake holders of a project, structure of project organization, management levels, and traits of a project manager, Failures and success of a project.	**20%**	**5**
2	**CONSTRUCTION PLANNING** Introduction, activities involved types of project plan, work breakdown structure. Planning terminologies, CPM, PERT, Ladder network, Precedence network, Line of balance, GERT, RAMPS analysis	**15%**	**5**
3	**PROJECT SCHEDULING AND CONTROLLING** Introduction, Resource allocation and leveling of Major resources, Multi resource allocation, Optimal scheduling	**15%**	**5**
4	**PROJECT MONITORING AND CONTROL** Feasibility report, Project updating, Cost control, Earned value management, project progress reports, project control techniques, change management, reasons for failure	**20%**	**5**
5	**CONSTRUCTION MANAGEMENT** Reasons for success and failure, basics of projects, Construction Equipment and Management, Construction Account Management, Construction Material management, Construction Quality Management, Construction Safety Management, Computer Application In Construction Management, Workforce Motivation And Human Factors In Construction Management, Plant Management, Project Communication.	**15%**	**5**

i. Text Book and Reference Book:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Project Planning and Control with PERT and CPM by Punamia, B.C. and Khandelwal, K.K; Laxmi Publications

a. **Course Name:** Construction Techniques
b. **Course Code:** 203216102
c. **Prerequisite:** Knowledge of Basics of Civil Engineering and Construction equipment
d. **Rationale:** To expose students for various construction techniques adopted on construction projects to manage such projects efficiently & effectively
e. **Course Learning Objective:**

CLOBJ 1	Students will be able to identify and describe key modern and traditional construction methods, including their applications and limitations.
CLOBJ 2	Students will understand the properties of various construction materials and apply this knowledge to select appropriate materials for different construction techniques.
CLOBJ 3	Students will understand and apply essential construction safety protocols to minimize hazards and ensure a safe working environment.
CLOBJ 4	Students will develop problem-solving skills to address typical challenges in construction projects, such as delays and unforeseen site conditions.

f. **Course Learning Outcomes:**

CLO 1	Understand the limitations of construction techniques.
CLO 2	Implement modular construction practices.
CLO 3	Analyse various construction techniques

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. **Course Content:**

Sr. No.	**Content**	**Weightage**	**Teaching Hours**
1	**Introduction** Introduction to construction operations, erection work, automation processes and special equipment	**10%**	**5**
2	**Modular Construction** Principles, comparison and advantages of modular coordination, Introduction to Modular Construction,	**15%**	**7**

	Modular coordination, Modular Standardization, Modular System Building, Limitation and Advantages of Modular Construction		
3	**Prefabrication in Construction Industry** Introduction to Prefabricated structures, Principles, components, joints, storage handling and delivery of components. Planning for pre-casting, Selection of equipment for fabrication, Transport and erection of prefabricated components, Quality measures, Design considerations of precast elements, Safety measure during erection.	**20%**	**10**
4	**Special Industrial Structures Construction** Industrial Structures, Tall structures, special concrete requirements, special construction equipment, IS codes for special structures, Quality control and safety management for special structures	**20%**	**10**
5	**Formwork** Requirements of Formwork, Loads carried by Formwork, Types of Formwork: Timber, Steel, Modular shuttering, Slip forms, Scaffolding, Jump forms, Safety in Formworks	**20%**	**10**
6	**Repair and Retrofitting Techniques** Technology of repairs for concrete, steel, timber, masonry works, grouting, stitching, jacketing, Damage assessment methods, Effect of dampness, heat, frost, precipitation, chemical agents, biological agents on building materials in relation of life, serviceability and strength, Machines, tools, instruments for investigation, NDT and repairs	**15%**	**8**

i. Text Book and Reference Book:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Construction Engineering & Management by Seetharaman, S; Umesh Publications

a. **Course Name:** English for Research Paper Writing
b. **Course Code:** 203200102
c. **Prerequisite:** Basic Knowledge about sentence formation using different words in present, past tenses and future time. Also, basic knowledge on use of suitable nouns, adjectives, verbs, preposition, etc.
d. **Rationale:** To provide a better insight for the effective use of grammar knowledge especially in writing and to put their own thoughts in to writing
e. **Course Learning Objective:**

CLOBJ 1	Learn the essential components of a research paper, including the abstract, introduction, methodology, results, discussion, and conclusion.
CLOBJ 2	Develop skills to write clear, concise, and well-organized research papers that adhere to academic standards and conventions.
CLOBJ 3	Expand your academic vocabulary and improve your ability to use technical terms and phrases relevant to your research field.
CLOBJ 4	Gain proficiency in referencing and citation styles (APA, MLA, etc.), ensuring proper credit to sources and avoiding plagiarism.
CLOBJ 5	Learn how to critically review and provide constructive feedback on research papers, as well as how to incorporate feedback into your own writing.

f. **Course Learning Outcomes:**

CLO 1	Understand the limitations of construction techniques.
CLO 2	Implement modular construction practices.
CLO 3	Analyse various construction techniques

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
2	**0**	**0**	**Audit**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Unit 1** Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.	**16%**	**5**
2	**Unit 2** Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts., Introduction	**17%**	**5**
3	**Unit 3** Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	**17%**	**5**
4	**Unit 4** Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	**17%**	**5**
5	**Unit 5** Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.	**16%**	**5**
6	**Unit 6** Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.	**16%**	**5**

i. Text Book and Reference Book:

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

a. **Course Name:** Disaster Management
b. **Course Code:** 203200103
c. **Prerequisite:** Basics related to the disaster
d. **Rationale:** To prepare for a leadership role in disaster management or the humanitarian field with in depth knowledge of resilienceand risk reduction.
e. **Course Learning Objective:**

CLOBJ 1	Learn about different types of disasters, both natural and human-made, and their underlying causes and impacts on communities and the environment.
CLOBJ 2	Develop the ability to assess disaster risks and implement effective mitigation strategies to reduce the impact of potential disasters.
CLOBJ 3	Gain knowledge of emergency preparedness practices and response planning, including the creation of disaster response plans and coordination with relevant agencies.
CLOBJ 4	Understand the processes involved in post-disaster recovery and rehabilitation, focusing on rebuilding communities, restoring infrastructure, and supporting affected populations.
CLOBJ 5	Explore the legal frameworks, policies, and ethical considerations in disaster management, including the roles and responsibilities of government, NGOs, and other stakeholders.

f. **Course Learning Outcomes:**

CLO 1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response
CLO 2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CLO 3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
CLO 4	Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	

2	**0**	**0**	**Audit**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	**17%**	**5**
2	**Repercussions of Disasters and Hazards:** Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem, Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	**17%**	**5**
3	**Disaster Prone Areas in India:** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics.	**17%**	**5**
4	**Disaster Preparedness and Management** Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	**17%**	**5**
5	**Risk Assessment** Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's, Participation in Risk Assessment. Strategies for Survival.	**16%**	**5**
6	**Disaster Mitigation** Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.	**16%**	**5**

i. Text Book and Reference Book:

1. Disaster Management in India: Perspectives, issues and strategies by R. Nishith, Singh AK | 'New Royal Book Company.

2. Disaster Mitigation Experiences and Reflections by Sahni, Pardeep Et.Al. (Eds.) | Prentice Hall of India, New Delhi.
3. Disaster Administration and Management Text and Case Studies by Goel S. L., | Deep &Deep Publication Pvt. Ltd., New Delhi.

a. **Course Name:** Sanskrit for Technical Knowledge
b. **Course Code:** 203200104
c. **Prerequisite:** Basics related to the Sanskrit
d. **Rationale:** To learn Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power and also will help scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.

e. **Course Learning Objective:**

CLOBJ 1	Learn foundational Sanskrit terms and concepts used in various scientific and technical fields, enabling a deeper understanding of ancient Indian contributions to modern knowledge.
CLOBJ 2	Develop the ability to read and interpret classical Sanskrit texts and manuscripts that discuss technical subjects such as mathematics, astronomy, medicine, and engineering.
CLOBJ 3	Gain skills in translating and interpreting technical content from Sanskrit to modern languages, making ancient knowledge accessible for contemporary use.
CLOBJ 4	Understand the historical context and significance of Sanskrit literature in the development of various scientific disciplines, including the study of ancient texts on Ayurveda, architecture, and metallurgy.
CLOBJ 5	Learn how to integrate Sanskrit technical knowledge with modern scientific research and innovations, fostering a holistic approach to problem-solving in engineering, medicine, and technology.

f. **Course Learning Outcomes:**

CLO 1	Understanding basic Sanskrit language
CLO 2	Ancient Sanskrit literature about science & technology can be understood
CLO 3	Being a logical language will help to develop logic in students

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
2	**0**	**0**	**Audit**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	**Unit 1** Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences	**33%**	**10**
2	**Unit 2** Order, Introduction of roots, Technical information about Sanskrit Literature	**33%**	**10**
3	**Unit 3** Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	**34%**	**10**

i. Text Book and Reference Book:

1. Abhyaspustakam by Dr. Vishwas | Samskrita-Bharti Publication, New Delhi
   Teach Yourself Sanskrit by Prathama Deeksha-Vempati Kutumbshastri | Rashtriya Sanskrit Sansthanam, New Delhi Publication
2. India's Glorious Scientific Tradition by Suresh Soni | Ocean books (P) Ltd., New Delhi

a. **Course Name:** Value Education
b. **Course Code:** 203200105
c. **Prerequisite:** Importance of the Education
d. **Rationale:** This course prepares the students to understand value of education and self- development, imbibe good values in students and Let the should know about the importance of character.

e. **Course Learning Objective:**

CLOBJ 1	Learn about fundamental human values such as respect, empathy, integrity, and compassion, and their importance in personal and professional life.
CLOBJ 2	Develop the ability to make ethical decisions by applying moral principles and values to real-life situations, both in personal conduct and in societal roles.
CLOBJ 3	Enhance emotional intelligence by understanding the role of values in managing emotions, building healthy relationships, and fostering a positive mindset.
CLOBJ 4	Gain awareness of social responsibilities and the importance of contributing positively to society, focusing on community service, environmental stewardship, and social justice.
CLOBJ 5	Learn practical strategies for integrating values into daily routines and professional practices, promoting a value-driven lifestyle that aligns with individual and collective well-being.

f. **Course Learning Outcomes:**

CLO 1	Knowledge of self-development
CLO 2	Learn the importance of Human values
CLO 3	Develop the overall personality

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
2	**0**	**0**	**Audit**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Unit 1** Values and self-development: Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments	**20%**	**8**
2	**Unit 2** Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline	**27%**	**8**
3	**Unit 3** Personality and Behaviour Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature.	**27%**	**8**
4	**Unit 4** Character and Competence Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively	**27%**	**8**

i. Text Book and Reference Book:

1. Values and Ethics for organizations Theory and practice by Chakroborty, S.K. | Oxford University Press, New Delhi, Pub. Year 1999

a. **Course Name:** Project Material Management
b. **Course Code:** 203216131
c. **Prerequisite:** Basic knowledge of civil engineering materials
d. **Rationale:** To give knowledge to students to select proper materials for desired performance, durability, minimum maintenance & repair for construction projects.

e. **Course Learning Objective:**

CLOBJ 1	Learn the key processes involved in material management, including procurement, storage, inventory control, and distribution, ensuring efficient use of resources in a project.
CLOBJ 2	Develop skills to balance inventory levels, minimizing costs while ensuring the availability of materials when needed, through techniques like Just-In-Time (JIT) and Economic Order Quantity (EOQ).
CLOBJ 3	Gain knowledge in selecting reliable suppliers and building strong relationships with them to ensure timely delivery, quality materials, and cost-effective procurement.
CLOBJ 4	Understand methods for controlling costs related to materials, including budgeting, cost estimation, and tracking, to maintain financial efficiency throughout the project lifecycle.

f. **Course Learning Outcomes:**

CLO 1	Understand the Different Contractual Management System Used In Construction.
CLO 2	Understand Regarding The E- Business And Selection Methods Of Procurement Systems.
CLO 3	Understand The Use Of Advanced Management Oriented Issues In Construction Projects

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction** Introduction To Procurement Systems; Common Variants of Main Procurement Systems; Separated Procurement Systems; Integrated Procurement Systems; Management oriented	20%	12
2	**Procurement Systems Management** Contracting, Construction management; Design and manage; Discretionary Procurement Systems; Project partnering; Strategic partnering; Project Alliances; Relational Contracting; Contract Administration; Contract Management.	40%	24
3	**Organising The Project Procurement Process** Organizational Design; Emerging Issues in Procurement Systems Cultural issues, e-Business; E-Tendering, Benefits of e-Tendering, Selection of Procurement Systems; Case Studies on Procurement Systems of Parastatal Entities	40%	24

i. Text Book and Reference Book:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Construction Engineering & Management by Seetharaman, S; Umesh Publications

a. **Course Name:** Construction Equipment Management
b. **Course Code:** 203216132
c. **Prerequisite:** Basic knowledge of civil engineering equipment
d. **Rationale:** To learn various equipment used in construction world. TO classify requirement of equipment as per project phases and type of construction work to be done. The subject also aims at imparting knowledge about efficiency and productivity of various equipment used in construction projects.

e. **Course Learning Objective:**

CLOBJ 1	Learn about various types of construction equipment, their specific functions, and how to select the right equipment for different construction tasks to maximize efficiency and effectiveness.
CLOBJ 2	Develop skills in planning and implementing preventive maintenance schedules, troubleshooting equipment issues, and ensuring the longevity and reliability of construction machinery.
CLOBJ 3	Gain knowledge in analyzing the costs associated with construction equipment, including acquisition, operation, and maintenance, and learn how to create and manage budgets for equipment use in construction projects.
CLOBJ 4	Understand techniques for optimizing the utilization of construction equipment, minimizing idle time, and improving productivity through effective scheduling and resource management.

f. **Course Learning Outcomes:**

CLO 1	Select construction equipment appropriate to tasks.
CLO 2	Estimate equipment ownership and operating costs.
CLO 3	Estimate and schedule activities using equipment productivity and cost data.
CLO 4	Understand contemporary issues pertaining to construction methods, equipment usage and management.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination.

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Equipment Economics** Equipment records, Cost of Capital, Elements of ownership Cost, Operating Cost, Replacement Decisions, Rent and Lease Considerations	15%	7
2	**Planning for Earthwork Construction and Equipment** Planning, Graphical Presentation of Earthwork, Earthwork Quantities, Mass Diagram, Pricing Earthwork Operations, Compaction of Soil and rock, Types of Compacting Equipment, Dynamic Compaction, Stabilizing soils with Lime, Cement Soil Stabilization., Earthwork equipment and performance parameters	20%	10
3	**Piling and RCC Works** Piling rigs, concrete pumps, batching plant, feasibility and efficiency of batching plant, RMC, placer booms, tower cranes, construction powe & water, Automatic Bar bending machines	20%	10
4	**Mobile Equipment Power Requirements** Required Power, Available power, Usable power, Performance Charts	10%	5
5	**Steel Structure Works** Cranes for structural works, crane load charts, crane safety, jacks for heavy lifts, productivity analysis of a crane, operating cost, idling and utilization efficiency, special equipment for accessibility in tall structures.	20%	10
6	**Trucks and Hauling Equipment, Finishing Equipment** Trucks, productivity, Performance Calculations, Graders, Trimmers	15%	6

i. Text Book and Reference Book:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Construction Engineering & Management by Seetharaman, S; Umesh Publications

a. **Course Name:** Advanced Construction Technologies
b. **Course Code:** 203216133
c. **Prerequisite:** None
d. **Rationale:** To expose students for various construction techniques adopted on construction projects to manage such projects efficiently & effectively

e. **Course Learning Objective:**

CLOBJ 1	Learn about cutting-edge construction methods such as 3D printing, modular construction, and prefabrication, and understand their applications in modern construction projects.
CLOBJ 2	Gain knowledge of sustainable construction technologies, including green building materials, energy-efficient systems, and waste reduction techniques, to promote environmentally friendly construction practices.
CLOBJ 3	Develop proficiency in using BIM software for designing, planning, and managing construction projects, improving collaboration, accuracy, and efficiency across project teams.
CLOBJ 4	Explore the role of automation and robotics in construction, including the use of drones, autonomous vehicles, and robotic equipment, to enhance productivity and precision on job sites.
CLOBJ 5	Understand the integration of smart technologies, such as IoT and AI in construction for real-time monitoring, data analysis, and decision-making, leading to smarter and more efficient project management.

f. **Course Learning Outcomes:**

CLO 1	Learn various advance construction techniques
CLO 2	Understand characteristics of Nano material
CLO 3	Know application of Nano material
CLO 4	Know application of dewatering techniques

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Module I** Introduction for various Advance Construction Techniques and Technology used for constructions like: Scaffolding, Automation in Construction, Dewatering, Nano Technology in Construction, Formworks, Enabling Structures, Self- Compacting Concrete, Ready Mix Concrete, Modular Coordination, Erection Technology / Prefabrication in Construction Industry, Trenchless Techniques, Mechanical Compaction of Concrete, Tunnelling Operation, Techniques of Excavation.	5%	4
2	**Module II** Introduction to Scaffolding, types of scaffolding, role of scaffolding, advantage and disadvantage of scaffolding. Introduction to Form Work, slip form system, method of removing formwork. Introduction to Enabling structures for the construction project (including special types of formwork)	20%	14
3	**Module III** Introduction to Automation in construction, objective of automation, advantage and disadvantage of Automation in construction	10%	6
4	**Module IV** Introduction to Various Dewatering Techniques like Grouting, Vacuum dewatering techniques, Deep well System, Freezing techniques	10%	6
5	**Module V** Introduction to Nano Technology in Constructions, Various Nano materials like Nano silica, Nano-steel, Nano-paints	10%	6
6	**Module VI** Introduction to special types of concrete and concreting methods: Ready Mix Concrete, Self-compacted concrete etc. Introduction to compaction of concrete, various types of vibrators.	15%	8
7	**Module VII** Introduction to modular coordination, Principles, comparison and advantages of modular coordination.• Prefabrication in construction industry, Principles, components, joints, storage handling and delivery of components	15%	8
8	**Module VIII** Introduction to Trenchless techniques, Rib Loc technology, Horizontal Directional Drilling, etc. Introduction to operation of tunnelling, various methods	15%	8

	used for tunnelling. Introduction to techniques of excavation according to types of soil		

i. Text Book and Reference Book:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Construction Engineering & Management by Seetharaman, S; Umesh Publications

a. **Course Name:** Quality and safety management in construction projects
b. **Course Code:** 203216134
c. **Prerequisite:** Knowledge of basic safety measures
d. **Rationale:** To learn occupational quality & safety hazard assessment. To give knowledge to prepare safety and health programs. To develop safety culture in construction firms

e. **Course Learning Objective:**

CLOBJ 1	Learn the principles and components of Quality Management Systems (QMS) in construction, including quality planning, assurance, and control, to ensure that construction projects meet industry standards and client expectations.
CLOBJ 2	Gain the ability to create comprehensive safety management plans that address potential hazards, establish safety protocols, and ensure compliance with occupational health and safety regulations.
CLOBJ 3	Acquire practical skills in implementing quality control techniques such as inspections, testing, and corrective actions to monitor and maintain the quality of construction work throughout the project lifecycle.
CLOBJ 4	Learn to conduct risk assessments, identify potential safety hazards, and develop mitigation strategies to minimize accidents and injuries on construction sites.
CLOBJ 5	Understand the importance of promoting a safety-first culture in construction projects, including training programs, safety communication, and leadership involvement, to enhance overall project safety and quality outcomes.

f. **Course Learning Outcomes:**

CLO 1	Understand different aspects of quality and related tools.
CLO 2	Apply techniques of total quality assurance and quality control programme and cost implication.
CLO 3	Understand importance of various aspects of safety during construction activity.
CLO 4	Apply principles of environmental safety to construction projects.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
4	**0**	**0**	**4**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Quality Management** Quality policy in construction Industry- Consumer satisfaction- Ergonomics, Time of Completion-Statistical Tolerance-Taguchi's concept of quality- Contract and construction Programming-Inspection procedures., total quality control concept, sustainable construction methods	20%	10
2	**Quality Assurance and Control** Total QA/QC Program and cost implication. Different aspects of quality-Appraisals, failure mode analysis, Stability methods and tools, Influence of drawings, detailing, specification, quality assurance protocols, work procedure preparation, advanced quality programs	35%	16
3	**Standardization** Standardization-Bid preparation-Construction activity, the SOP method	20%	10
4	**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.	25%	12

i. Text Book and Reference Book:

1. 1.Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Project Planning and Control with PERT and CPM by Punamia, B.C. and Khandelwal, K.K; Laxmi Publications
3. Construction Engineering & Management by Seetharaman, S; Umesh Publications

a. **Course Name:** HR in Construction Management
b. **Course Code:** 203216135
c. **Prerequisite:** None
d. **Rationale:** To impart knowledge of material management and equipment management for efficient & effective management of construction projects
e. **Course Learning Objective:**

CLOBJ 1	Learn the key HR functions specific to construction management, including recruitment, workforce planning, and talent management, to effectively build and maintain a skilled construction workforce.
CLOBJ 2	Gain knowledge of labor laws, regulations, and compliance requirements relevant to the construction industry, ensuring that HR practices align with legal standards and protect both employees and the organization.
CLOBJ 3	Develop strategies to foster diversity and inclusion on construction sites, addressing challenges related to multicultural teams and promoting a positive and equitable work environment.
CLOBJ 4	Acquire skills in managing employee relations, resolving conflicts, and maintaining a harmonious work environment on construction sites, ensuring that disputes are handled efficiently and constructively.

f. **Course Learning Outcomes:**

CLO 1	To select the best alternative for Material Management in construction appropriate to considered tasks.
CLO 2	Estimate the Market analysis of the various uncertain factors which ultimately affects the different Equipment of the construction.
CLO 3	Estimate and schedule activities using equipment productivity and cost data.
CLO 4	Understand contemporary issues pertaining to construction methods, equipment usage and material management..

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
4	**0**	**0**	**4**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Introduction** Basic of personnel management, manpower planning, labour laws and industrial relations. The role of personnel management in construction enterprises.	**20%**	**8**
2	**Personnel Management** Concepts, definitions, growth, role and functions, new developments in HRD and HRM, manpower estimation for company and project, methods and procedures of estimation at various stages.	**20%**	**8**
3	**Related Aspects** Methods of recruitment, selection, training, placement, financial compensation, discipline, separation etc. in employing and retaining engineers and managers.	**20%**	**8**
4	**Personnel Office at Head Office and Project Site** Role, functions, status and relationship with other departments, personnel office records and procedures.	**20%**	**8**
5	**Legal Aspects** Labour legislation, related labour acts, grievance handling, enquiry procedure, Labour administration and judiciary in regards to construction industry.	**20%**	**8**

i. Text Book and Reference Book:

1. Project Planning and Control with PERT and CPM by Punamia, B.C. and Khandelwal, K.K; Laxmi Publications
2. Construction Engineering & Management by Seetharaman, S; Umesh Publications

a. **Course Name:** Advance construction materials
b. **Course Code:** 203216136
c. **Prerequisite:** None
d. **Rationale:** To give knowledge to students to select proper materials for desired performance, durability, minimum maintenance & repair for construction projects
e. **Course Learning Objective:**

CLOBJ 1	Learn about the latest advancements in construction materials, including high-performance concrete, advanced composites, self-healing materials, and smart materials, and understand their applications in modern construction projects.
CLOBJ 2	Gain a deep understanding of the physical, chemical, and mechanical properties of advanced construction materials, and how these properties influence their performance in various construction environments.
CLOBJ 3	Develop knowledge of sustainable construction materials, such as recycled, renewable, and low-carbon materials, and learn how to evaluate and select materials based on their environmental impact and life cycle assessment.
CLOBJ 4	Explore advanced manufacturing and processing techniques for construction materials, including 3D printing, nanotechnology, and prefabrication, and understand their role in enhancing material efficiency and performance.
CLOBJ 5	Learn the methods and standards for testing and quality assurance of advanced construction materials, ensuring they meet the required specifications and perform reliably in construction applications.

f. **Course Learning Outcomes:**

CLO 1	Understand the structural, physical and long-term performance of building materials used in construction.
CLO 2	Understand mechanical and non-mechanical behavior of advance materials.
CLO 3	Understand the use of advanced materials in construction projects. Identify crucial problem areas in manufacture and applications of building materials.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
4	**0**	**0**	**4**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Module 1** Walling units, binding materials and additives, aggregates, gypsum products, wood base products, ferrous and nonferrous metal products, concrete and its various varieties, fly-ash bricks.	**30%**	**18**
2	**Module 2** Durability, mechanical, deformational behavior and thermo physical properties for thermal insulation, sound insulation and damp prevention application materials, Adhesives and sealants.	**30%**	**18**
3	**Module 3** Recent developments and market awareness regarding applications, varieties, sizes and specification for various materials.	**20%**	**12**
4	**Module 4** Historical back ground of Light weight aggregate concrete, Artificial aggregates, Physical properties of aggregates, Light weight aggregate concrete, Applications of light weight aggregate concrete, Properties of green light weight aggregate concrete, Effect of size aggregate on the strength properties of LWAC made with palm oil shells, Recycled aggregate, Pre placed aggregate concrete	**20%**	**12**

i. Text Book and Reference Book:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha; Pearson Education
2. Project Planning and Control with PERT and CPM by Punamia, B.C. and Khandelwal, K.K; Laxmi Publications

2nd semester

a. **Course Name:** Strategy Management
b. **Course Code:** 203216152
c. **Prerequisite:** Construction Economics and Finance
d. **Rationale:** To identify the relevant government environment: laws, policies, regulations etc. with respect to a given industry/firm. To analyze the relevant government environment for corporate planning and policy decisions. To recognize the impact and changes in the regulatory and other profiles of the government environment over different stages of corporate growth

e. **Course Learning Objective:**

CLOBJ 1	Learn the fundamentals of strategic planning, including setting objectives, analyzing internal and external environments, and developing long-term strategies to achieve organizational goals.
CLOBJ 2	Gain insights into various competitive strategies, such as cost leadership, differentiation, and focus, and understand how to apply these strategies to gain a competitive advantage in the market.
CLOBJ 3	Develop skills to effectively implement strategic plans, monitor progress, and adjust strategies as needed based on performance metrics and changing business conditions.
CLOBJ 4	Learn techniques for strategic decision-making, including data analysis, risk assessment, and scenario planning, to make informed decisions that align with the organization's strategic objectives.
CLOBJ 5	Acquire methods for evaluating the effectiveness of strategic initiatives, using tools such as balanced scorecards and key performance indicators (KPIs), to measure success and ensure alignment with overall organizational goals.

f. **Course Learning Outcomes:**

CLO 1	Identify various strategies to manage projects
CLO 2	Analyse various strategical requirements to execute a projects
CLO 3	Maximize profits of a project by adopting optimized strategies according to project scenario and market condition.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Strategy and Process:** Conceptual framework for Strategic Management, The Concept of Strategy and the Strategy Formation Process, Stakeholders in business, Vision, Mission and Purpose, Business definition, Objectives and Goals, Corporate Governance and Social responsibility	**15%**	**7**
2	**Competitive Advantage:** External Environment, Porter's Five Forces Model, Strategic Groups Competitive, Globalization and Industry Structure, National Context and Competitive advantage Resources, Capabilities and competencies, Core competencies, Generic Building Blocks of Competitive Advantage, Distinctive Competencies, Resources and Capabilities durability of competitive Advantage, Avoiding failures and sustaining competitive advantage, Case study.	**20%**	**10**
3	**Strategies:** The generic strategic alternatives, Stability, Expansion, Retrenchment and Combination strategies, Business level strategy, Strategy in the Global Environment, Corporate Strategy, Vertical Integration, Diversification and Strategic Alliances, Building and Restructuring the corporation, Strategic analysis and choice, Environmental Threat and Opportunity Profile (ETOP), Organizational Capability Profile, Strategic Advantage Profile, Corporate Portfolio Analysis, SWOT Analysis, GAP Analysis, Mc Kinsey's 7s Framework, GE 9 Cell Model, Distinctive competitiveness, Selection of matrix, Balance Score Card, case study.	**20%**	**10**
4	**Financial Strategies:** Growth strategy, stabilization strategy and retrenchment strategy. Portfolio strategies G.E, B.C.G & Arthur D. Littles model.	**10%**	**5**
5	**STRATEGY IMPLEMENTATION & EVALUATION:** The implementation process, Resource allocation, designing organizational structure, Designing Strategic Control Systems, Matching structure and control to strategy, Implementing Strategic change, Politics, Power and Conflict, Techniques of strategic evaluation & control, Case study.	**20%**	**10**
6	**STRATEGIC MANAGEMENT EVALUATION AND CONTROL:**	**15%**	**6**

	Strategy implementation and evaluation control of strategic performance-performance gap, ROI, Budget and Financial Ratios, Strategy Audit.		

i. Text Book and Reference Book:

1. Business Strategy: Managing Uncertainty, Opportunity, and Enterprise by J.C. Spender
2. The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment by Robert Kaplan and David Norton
3. The Art of Strategy: A Game Theorist's Guide to Success in Business and Life by Avinash K. Dixit and Barry J. Nalebuff

a. **Course Name:** O.R. in Construction Management
b. **Course Code:** 203216153
c. **Prerequisite:**
d. **Rationale:**

e. **Course Learning Objective:**

CLOBJ 1	Learn various operations research techniques and methodologies, such as linear programming, integer programming, and simulation, and their applications in optimizing construction management processes.
CLOBJ 2	Develop skills in applying optimization models to solve complex construction problems, including resource allocation, scheduling, and project planning, to improve efficiency and reduce costs.
CLOBJ 3	Gain expertise in using operations research methods to assess and manage risks and uncertainties in construction projects, enabling more informed decision-making and risk mitigation strategies.
CLOBJ 4	Learn how to design and implement decision support systems using operations research tools to aid in decision-making processes related to construction project management.

f. **Course Learning Outcomes:**

CLO 1	Develop skills to optimize the allocation of resources, including labor, materials, and equipment,
CLO 2	Enhance decision-making capabilities by using O.R. models and tools to analyse construction project scenarios
CLO 3	Gain proficiency in using operations research methods to implement effective project scheduling

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Module I:** Transportation and assignment problems: Transportation problem: Basic feasible solutions using N-W Corner rule, Minimum cost method, Vogel's approximation method.	10%	6
2	**Module 2** Optimal solutions using Stepping Stone Method, Modified distribution method	10%	6
3	**Module 3:** Decision theory: Decision in certainty: Analytical hierarchy approach, Comparison Matrix, Consistency test, Probabilistic decision making: Expected value approach, sensitivity analysis on payoffs, Optimal decision strategy	15%	8
4	**Module 4:** Games theory simulations applied to construction: n x m person zero sum games with finite strategies, Maximum & Minimax strategies, Saddle points, Rule of dominance.	20%	8
5	**Module 5:** Solution methodologies: Algebraic method, Graphical method, Method of matrices, LP method, Iterative method of approximate solution.	20%	8
6	**Module 6** Modifications and improvement on CPM/PERT techniques: Beyond CPM/PERT: Overview of the pitfalls of making traditional CPM/PERT assumptions. PERT technique extended to Monte-Carlo simulation analyses.	15%	8
7	**Module 7** CPM: advantages of circle notation diagram for the presentation of CPM project plans. Concept of dependent operations overlapping in time.	10%	6

i. Text Book and Reference Book:

1. Foundations of Operations Research by H.A. Taha
2. Operations Research Problems and Solutions by M. Badri
3. Operations Research by P. Rama Murthy

a. **Course Name:** Probability and statistics
b. **Course Code:** 203216181
c. **Prerequisite:**
d. **Rationale:**

e. **Course Learning Objective:**

CLOBJ 1	Learn the fundamental concepts of probability, including probability distributions, random variables, and theorems, to analyze and interpret uncertainty and randomness in various scenarios.
CLOBJ 2	Develop skills in applying statistical methods for data analysis, including descriptive statistics, hypothesis testing, and regression analysis, to make informed decisions based on data.
CLOBJ 3	Gain proficiency in interpreting and presenting statistical data effectively, using visualizations such as graphs, charts, and tables to communicate findings clearly.
CLOBJ 4	Learn techniques for statistical inference, including confidence intervals and significance tests, to draw conclusions and make predictions based on sample data.

f. **Course Learning Outcomes:**

CLO 1	Develop a solid understanding of probability theory, including random variables, probability distributions, and the laws of probability.
CLO 2	Gain proficiency in applying statistical techniques such as hypothesis testing, confidence intervals, and regression analysis to solve real-world problems.
CLO 3	Learn to collect, analyze, and interpret data using statistical tools, enabling informed decision-making in various contexts.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**1**	**0**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. **Course Content:**

Sr. No.	**Content**	**Weightage**	**Teaching Hours**
1	**Probability and Probability Distribution** Sample space and events; Counting; Probability; Axioms of Probability; Elementary theorems; Conditional	**10%**	**6**

	probability; Baye's theorem; Mathematical expectation and decision making; Random variables; Binomial distribution ; hypergeometric distribution ; Mean and variance of probability distribution		
2	**Probability Densities** Continuous random variables; Normal distribution; Uniform distribution; Log normal distribution; Gamma distribution ; Beta distribution ; Weibull distribution	**10%**	**6**
3	**Treatment of Data and Sampling Distributions** Frequency distributions; Graphs of frequency distributions; Stem and leaf plots; Descriptive measures; Mean and standard deviation; Populations and samples; Sampling distribution of mean (known); Sampling distribution of mean (unknown) ; Sampling distribution of variance	**10%**	**6**
4	**Inferences Concerning Means and Variances** Point estimation; Interval estimation; Tests of hypotheses; Null hypotheses and significance tests; Hypotheses concerning one mean; Hypotheses concerning two means; Estimation of variances; Hypotheses concerning one variance ; Hypotheses concerning two variances	**15%**	**6**
5	**Non parametric Tests** Sign test; Rank sum test; Tests of randomness; Kolmogorov Smirnov tests	**15%**	**9**
6	**Curve Fitting** Method of least square; Inferences based on least square estimators; Curvilinear regression; Multiple regression; Correlation	**15%**	**9**
7	**Analysis of Variance** General principles; Completely randomized designs; Randomized block designs; Multiple comparisons; Analysis of covariance	**15%**	**9**
8	**Factorial Experimentation** Two factor experiments ; Multifactor experiments ; 2n factorial experiments		**9**

i. Text Book and Reference Book:

1. An Introduction to Probability and Statistics by Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh
2. Probability and Statistics for Engineers and Scientists" by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye

a. **Course Name:** Value Engineering
b. **Course Code:** 203216182
c. **Prerequisite:** None
d. **Rationale:** To impart knowledge to know, to target & to remove unnecessary cost associated with every design & project. To establish importance of rupee saved over rupee generated

e. **Course Learning Objective:**

CLOBJ 1	Learn the core principles and methodologies of value engineering, including the focus on improving function, reducing cost, and enhancing value through systematic analysis and creative problem-solving.
CLOBJ 2	Develop skills in performing value analysis to evaluate the functions of a product or process, identify opportunities for improvement, and eliminate unnecessary costs while maintaining performance and quality.
CLOBJ 3	Develop skills in performing value analysis to evaluate the functions of a product or process, identify opportunities for improvement, and eliminate unnecessary costs while maintaining performance and quality.
CLOBJ 4	Learn how to integrate value engineering practices into project management processes, including project planning, design, and execution, to enhance project value and efficiency.

f. **Course Learning Outcomes:**

CLO 1	To better understanding of an environmental impact assessment with value engineering approach in construction industry.
CLO 2	Understand contemporary issues pertaining to construction methods by value engineering approaches.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**1**	**-**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Fundamental of Value Engineering:** Basic terms and definitions, Overview of the systematic approach, general phase, information phase, function phase, creative phase, valuation phase, investigation and recommendation phase.	5%	4
2	**Value Engineering Job Plan:** Project selection, phases, Function cost worth, FAST diagramming, VE versus quality, performance and other parameters. Value Engineering from Design to Hand-over., optimization techniques Cost control theory, life cycle cost theory. Environmental impact assessment with value engineering approach. Case studies, applications of value engineering, for a building project and waste-water treatment plant.	20%	14
3	**Functional Analysis:** Functions at various levels and of various types, cost and worth of function, importance of functional analysis, How to prepare - FAST Diagramming	10%	6
4	**COST MODEL:** Introduction, Value, Cost and Worth, True and Poor value, Factors affecting the value, Value Index, Cost and Value Gap, importance of cost model in Value Engineering , Function and Matrix Cost model, Life cycle cost analysis	10%	6

i. Text Book and Reference Book:

1. Value Engineering: A Plan for Invention by Charles W. Mize.
2. Value Engineering: Practical Applications for Design, Construction, Maintenance, and Operations by James H. Galloway.

a. **Course Name:** Resource Management
b. **Course Code:** 203216183
c. **Prerequisite:** None
d. **Rationale:** To impart knowledge of material management and equipment management for efficient & effective management of construction projects.

e. **Course Learning Objective:**

CLOBJ 1	Learn about different types of resources (e.g., human, financial, material) and how to allocate them efficiently to meet project goals and organizational objectives.
CLOBJ 2	Gain skills in creating resource plans that include forecasting resource needs, scheduling, and optimizing resource utilization to ensure that resources are available when needed.
CLOBJ 3	Explore techniques and tools for optimizing resource use, such as resource leveling, capacity planning, and demand forecasting, to enhance efficiency and reduce waste.
CLOBJ 4	Learn strategies for identifying and resolving conflicts and constraints related to resource management, including balancing competing demands and addressing resource shortages.
CLOBJ 5	Develop methods for monitoring and controlling resource performance, including tracking resource usage, evaluating effectiveness, and making adjustments as necessary to stay on track with project and organizational goals.

f. **Course Learning Outcomes:**

CLO 1	To select the best alternative for Material Management in construction appropriate to considered tasks.
CLO 2	Estimate the Market analysis of the various uncertain factors which ultimately affects the different Equipment of the construction.
CLO 3	Estimate and schedule activities using equipment productivity and cost data.
CLO 4	Understand contemporary issues pertaining to construction methods, equipment usage and material management.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**1**	**-**	**4**	**20**	**20**	**20**	**60**	**30**	**150**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Material Management:** Materials & their peculiarities, material planning, accounting and material reconciliation. Systems of material classification. Role of purchasing function, restraints & factors, purchasing decisions, procedures, forms, records and reports, vendor analysis. Inventory models and control techniques, deterministic and probabilistic models and applications, ABC analysis, replenishment and replacement policies, VED analysis, lead time demand, purchase planning, EOQ model. Wastage audit at site, Site waste material management plan. Computer applications based upon available software.	35%	4
2	**Equipment Management:** Classification and operational characteristics and production rates of various equipment. New trends and construction equipment of future. Planning and selection of equipment, for earthmoving, hauling, hoisting, conveying, pneumatic, pumping, aggregate production, concrete production, pile driving, tunneling and road construction applications. Equipment procurement, purchase, import of equipment, procedural formalities for import.	35%	14
3	**Preventive Maintenance:** Availability of spares, equipment servicing and servicing facilities, cost of preventive maintenance, lubricants and centralized lubrication, storage, handling and record keeping for spares.	15%	6
4	**Functional Analysis:** Functions at various levels and of various types, cost and worth of function, importance of functional analysis, FAST Diagramming -How to prepare	15%	6

i. Text Book and Reference Book:

1. Project Resource Management: A Practical Guide by Paul C. Dinsmore and Jeannette Cabanis-Brewin
2. The Complete Guide to Project Management for Construction by Frederick E. Gould and Nancy E. Joyce

a. **Course Name:** Construction Contract Management
b. **Course Code:** 203216184
c. **Prerequisite:** Construction Economics and Finance
d. **Rationale:** To make students aware of legal aspects of construction projects, of construction contract, of issues related to contract administration. To expose students of various disputes resolution techniques including arbitration

e. **Course Learning Objective:**

CLOBJ 1	Learn about different types of construction contracts (e.g., fixed-price, cost-plus, time and materials) and key contract clauses, including scope of work, payment terms, and performance requirements.
CLOBJ 2	Develop skills in administering construction contracts, including documentation, correspondence, and compliance with contract terms and conditions throughout the project lifecycle.
CLOBJ 3	Gain knowledge of processes and strategies for resolving contractual disputes and managing claims, including negotiation, mediation, and arbitration.
CLOBJ 4	Learn techniques for monitoring and controlling contract performance, including tracking progress, managing changes, and ensuring adherence to contract specifications and schedules.
CLOBJ 5	Understand the legal and regulatory aspects of construction contracts, including contract law, risk management, and compliance with industry standards and regulations.

f. **Course Learning Outcomes:**

CLO 1	Various types of contracts
CLO 2	Terms and conditions of contracts
CLO 3	Special and general terms of contract
CLO 4	Various laws and regulation prevailing in India about construction project arbitration and conflicts

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
4	**-**	**-**	**4**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Construction Laws:** Public law, Government Department and Local authorities, Private law, contracts, Tort, property law and building law, Labour Laws, Company Act	**35%**	**4**
2	**Construction Contracts and Contract management:** Contract specification, types of contract documents used for construction, Selecting a contractor, project closure and handing over, International Contracts	**35%**	**14**
3	**Arbritration:** Disputes, arbitration and litigation procedure-preparation, settlement, evidence.	**15%**	**6**
4	**Contract Conditions:** Contract administration, standard procedures for contract administration, coordination between various agencies, general and special terms of contract	**15%**	**6**

i. Text Book and Reference Book:

1. Construction Contract Management by K. K. Chitkara.
2. Construction Contracts and the Law by P. K. Jain.
3. Construction Management and Planning" by C. S. R. Murthy

a. **Course Name:** Project Risk Management
b. **Course Code:** 203216185
c. **Prerequisite:** None
d. **Rationale:** To give knowledge of various aspects of risk management to students so that they are able to identify risk events, to use of risk prompts, use of risk assessment tables and utility of grading of construction entities.

e. **Course Learning Objective:**

CLOBJ 1	Learn techniques for identifying and categorizing potential risks in a project, including both internal and external factors that could impact project success.
CLOBJ 2	Develop skills in assessing the likelihood and impact of identified risks, using quantitative and qualitative analysis methods to prioritize and evaluate risks.
CLOBJ 3	Gain expertise in creating and implementing risk mitigation strategies and action plans to minimize the impact of risks on project objectives and outcomes.
CLOBJ 4	Understand the importance of effective communication of risk information to stakeholders, including reporting on risk status, changes, and mitigation actions to ensure transparency and informed decision-making.

f. **Course Learning Outcomes:**

CLO 1	To identify the different types of Projects Risk factors and give their best possible alternative solution in most effective way.
CLO 2	Plan and develop Risk management solutions to construction projects.
CLO 3	Understand the principles of Risk project management, resource management and inventory.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
4	**-**	**-**	**4**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
4	**Course Content:** Importance of Risk, types of risks, quantifiable and unquantified risks	**20%**	**10**
2	**Risk Analysis and Management for Projects (RAMP):** Identifying risk events. Probability distribution. Stages in Investment life-cycle; determination of NPV and its standard deviation for perfectly co-related, moderately co-related and uncorrelated cash flows. Sensitivity analysis, scenario analysis simulation, decision tree analysis, risk profile method, certainly equivalent method; risk adjusted discount rate method, certainty index method, 3 point estimated method. Use of risk prompts, use of Risk Assessment tables, details of RAMP process, utility of Grading of construction entities for reliable risk assessment.	**30%**	**14**
3	**Risk Mitigation:** Risk mitigation by elimination, reducing, transferring, avoiding, absorbing or pooling. Residual risk, mitigation of unquantified risk. Coverage of risk through CIDC¶s MOU with the Actuarial Society of India through risk premium such as (BIP)±Bidding Indemnity Policy (DIMO)±Delay in meeting obligation by client policy, (SOC)± Settlement of claims policy (LOP)- Loss of profit policy (TI).	**30%**	**14**
4	**TRANSIT INSURANCE POLICY (LOPCE):** Loss of performance of construction equipment policy	**20%**	**10**

i. Text Book and Reference Book:

1. Construction Management and Planning by C. S. R. Murthy
2. Construction Management: Principles and Practice by K. K. Chitkara

a. **Course Name:** Sustainable Smart Building
b. **Course Code:** 203216186
c. **Prerequisite:** None
d. **Rationale:** To give knowledge of various aspects of risk management to students so that they are able to identify risk events, to use of risk prompts, use of risk assessment tables and utility of grading of construction entities.

e. **Course Learning Objective:**

CLOBJ 1	Develop skills in integrating smart building technologies, such as automation systems, IoT sensors, and smart grids, to enhance building performance, comfort, and efficiency.
CLOBJ 2	Gain knowledge of design strategies and technologies for optimizing energy use in buildings, including passive solar design, high-performance insulation, and energy-efficient HVAC systems.
CLOBJ 3	Learn the principles and practices of sustainable building, including energy efficiency, resource conservation, and environmental impact reduction, to design and construct eco-friendly buildings.
CLOBJ 4	Acquire techniques for evaluating the performance and sustainability of smart buildings, including monitoring energy use, assessing environmental impact, and using performance data to improve building operations.

f. **Course Learning Outcomes:**

CLO 1	Ability to design and critically evaluate building systems that integrate sustainable practices, including energy efficiency, resource conservation, and environmentally friendly materials.
CLO 2	Understand and apply relevant regulatory standards, codes, and best practices for sustainable and smart buildings to ensure compliance and promote industry standards.
CLO 3	Learn to assess the environmental and economic impacts of smart building solutions, using tools like life cycle assessment (LCA) and cost-benefit analysis to support sustainable decision-making.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
4	**-**	**-**	**4**	**20**	**20**	**-**	**60**	**-**	**100**

L- Lectures; **T**- Tutorial; **P-** Practical; **C**- Credit; **MSE-** Mid-Semester Evaluation, **CE**- Continuous Evaluation, **ESE-** End Semester Examination

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	**LEARNING OUTCOMES** To give a comprehensive introduction on the concepts of sustainability and the principles which governs. Understanding the implications of sustainability in various spheres such as social, economic, political and cultural	**12%**	**5**
2	**INTRODUCTION** Definitions of Sustainability - Various types of sustainability - Pillars of Sustainability - Circle of Sustainability – Need for Sustainability - systems and their sustainability - sustainability in the built environment context - Green Buildings -Difference between Green and Sustainability - Climate Change, Global warming - National and International policies and Regulations on sustainability.	**12%**	**7**
3	**CONCEPTS OF SUSTAINABILITY** Early man lifestyles - History and development of sustainability - Present day - Scale and context of sustainability - Current Issues and Solutions of sustainability - Vernacular architecture and its relevance.	**12%**	**4**
4	**PRINCIPLES OF SUSTAINABILITY** Political Sustainability, economic sustainability, cultural sustainability, social sustainability, building sustainability - Co-relationship between all - Driving factors of sustainable change - Engineering principles of Sustainability - Systems approach to sustainability.	**13%**	**8**
5	**APPLICATIONS IN THE BUILT ENVIRONMENT** Concepts of green buildings, climate responsive building - Reduction of energy consumption, direct and indirect methods - Reduction of water consumption, direct and indirect methods - Carbon footprint and eco footprints of buildings - New concepts and trends in green buildings, national and international.	**12%**	**8**
6	**INTRODUCTION TO SUSTAINABLE BUILDING MATERIALS** Introduction to sustainable building materials, qualities, use, examples - Natural building materials, locally available and locally manufactured materials, bio materials - Salvaged and recycled materials - Nontoxic materials: low VOC paints, coating and adhesives.	**15%**	**8**
7	**SUSTAINABLE CONSTRUCTION TECHNIQUES** Alternative construction techniques such as SMB, CSEB, and steam cured blocks, composite beam and panel funicular shells, filler slabs, reinforced concrete masonry, vaulted roofs, ferro-cement walls etc., - Case studies	**12%**	**4**

8	**INNOVATIVE USE OF MATERIALS** Use of waste materials such as paper, glass bottles, tires, shipping containers - Use of post-consumer and industrial waste such as fly-ash, bags, building demolition waste – use of salvaged materials from flooring, columns, beams, timber, glass, etc.	**12%**	**4**

i. Text Book and Reference Book:

1. Construction Management: Principles and Practice by K. K. Chitkara
2. The Complete Guide to Project Management for Construction by Frederick E. Gould and Nancy E. Joyce