

GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Construction Engineering & Management

Course / Subject Code: ME01014031

Course / Subject Name : Computational and Computer Aided Techniques in Construction Management



w. e. f. Academic Year:	2024-25
Semester:	1 st Semester
Category of the Course:	PEC

Prerequisite:	Operating Knowledge of Computers
Rationale:	The aim is to comprehend the use of compatible computation techniques in construction management, exploring various computer-aided methods that enhance precision, consistency, and reliability in project outcomes. By integrating advanced software tools, the focus is on optimizing planning, scheduling, and resource allocation. Additionally, examining how these techniques improve decision-making processes and overall project efficiency is crucial. The goal is to identify best practices and innovative solutions for modern construction management challenges, ensuring effective and streamlined operations.

No	Program Outcomes
01	Engage in critical thinking and research to develop solutions to multifold real-world problems.
02	Communicate effectively with the engineering community at large level on complex design tasks & prepare best workouts and deliverables.
03	Demonstrate a high level of professionalism in handling multidisciplinary and complex Construction engineering and management problems.
04	Plan, Schedule, Manage and Control the complex construction and infrastructure projects in a sustainable local and global context.
05	Address technical, societal issues pertaining to Construction engineering & management by offering state of art and robust, sustainable and practical solutions while upholding high standards of ethics and professionalism.

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
1.	Discuss various computation techniques and computer aided application in context of construction management.	U, R
2.	Demonstrate various features of computers software to understand the applicability in construction management allied tasks	A
3.	Apply the features of various softwares with hands on exercise for construction project management and allied activities.	A

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*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA/ CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Computation Techniques Computation Techniques: Need of Computational Multi criteria decision making techniques in construction management, Data collection techniques- Interview, Brainstorming with experts, Surveys and Questionnaire, Normalization and consistency check of collected data, Suitability and application of AHP method, TOPSIS method, Factor analysis.	13	30
2.	Computer Aided Applications Computer applications for construction project and management through allied works for the documentation, computation, presentation, drawings, cost estimation, and developing applications with database software. Features of Building information modelling(BIM),Application of BIM for Visualization, Clash detection, collaboration, and project scheduling . Application of Artificial Intelengence(AI) as ready reckoner, ERP software for integrated applications in construction management	10	20
3.	Application of computer for Construction management Use of spreadsheet software for the preparation of -work breakdown structure, scheduling, preparation of bar chart and milestone chart, for the preparation of construction project documents, what-if analysis, pivot table wizard, conditional formatting Features and application of Primavera software for project management for creating detailed schedule, resource allocation, progress tracking, Hand on application of one of the BIM with open access software, application of Google earth for construction projects	22	50
	Total	45	100



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Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	60	10	--	--

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources

Books:

1. Feigenbaum, L., "Construction Scheduling with Primavera Project Planner" Prentice Hall Inc., 2002.
2. Paulson, B.R., "Computer Applications in Construction", Mc Graw Hill, 1995.
3. Hardin, Brad Hardin, Dave McCool, Bim and Construction Management: Proven Tools, Methods, and Workflows; Wiley, 2015.

Web reference :-

1. <https://openoregon.pressbooks.pub/constructionexcel>
2. <https://www.analyticsvidhya.com/blog/2023/05/how-to-harness-the-full-potential-of-chatgpt-tips-prompts/>
3. https://hvacsimplified.in/wp-content/uploads/2022/05/4_5879807870286957058.pdf
4. <https://www.youtube.com/watch?v=KNXm4ULArIM>
5. <https://www.youtube.com/watch?v=3lG11VZjtg4>
6. https://www.youtube.com/watch?v=Q_YaEpadgyQ
7. <https://www.youtube.com/watch?v=sZyghGWiHc8>
8. <https://www.youtube.com/watch?v=8fnvdgYCIxI>
9. <https://www.semanticscholar.org/paper/Application-of-the-AHP-in-project-management-A1%E2%80%90Harbi/05c4aa986026b8a9cd1f7b075152592262c12937>
10. <https://www.youtube.com/watch?v=Br1NQK0Iumg>
11. <https://www.youtube.com/watch?v=J9zwPqLkH1w&list=PLFsDe5VTL0GONrBajWDMh6J2MdzrW0UwM>
12. <https://www.youtube.com/watch?v=76IMbiUbyDM&list=PLFsDe5VTL0GONrBajWDMh6J2MdzrW0UwM&index=2>
13. https://www.youtube.com/watch?v=aX8npmWWA_A



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(b) Software and website:

1. Microsoft Project , Primavera, MS office
2. Autodesk Revit and other open access software of BIM like Free-CAD

Suggested Course Assignment /Tutorial List:

Practical Work Assignments Based on :

1. Preparation of Work breakdown structure (WBS) in MS Excel
2. Preparation of Scheduling network in MS-Excel /Primavera
3. Preparation of Bar charts & Milestone Chart in MS-Excel /Primavera
4. Preparation of BOQ in MS-Excel
5. PERT network analysis.
6. Hands on exercise with the application of AHP, TOPSIS with real case study or Hypothetical problem definition.
7. Hands on exercise of BIM with open access software or Autodesk Revit.
8. Preparation of minimum 15 slides presentation in MS-PowerPoint regarding to planning of proposed project for the client/Govt. organization
9. Hands on exercise of Google earth for exploring the site selection, site feasibility, transportation routes of material supply etc.
