Marwadi University
Marwadi Chandarana Group

Bachelor of Technology

Civil Engineering

Construction Equipment and Automation

01CI0514

Objective of the Course:

- To impart knowledge with the various types of construction equipment, their applications, and how to select and operate them.
- To understand the principles and applications of drones in the construction industry.
- To make students understand about concepts of automation and their application in construction
- To able to analyze construction projects and recommend appropriate equipment and automation solutions to improve project efficiency.

Credit Earned: 03

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Select appropriate equipment for specific construction projects based on site Conditions and requirement.
2. Identify and describe the different types of construction equipment used in the industry.
3. Discover the capabilities and limitations of drones in construction projects.
4. Recognize emerging trends and innovations in automation for construction.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

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Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	**Introduction**	**03**
	Distinctive characteristics of construction equipment, Necessity of construction equipment, Importance of equipment in construction projects, Trends and innovations in construction equipment	
2	**Construction Equipment**	**14**
	Excavating Equipment, Pavers, Rollers, plastering machines, Cranes and Hoists, Concrete Batching Plants, Hauling and conveying equipment; Capacity, Feasibility, Safety, owning and operating cost of Different Construction Equipment	
3	**Automation in Construction Industry**	**8**
	Emerging Trends in Automation in Construction; Need, Challenges and Benefit of automation; Automated equipment and machinery for construction: Automation in Canal lining, Automation in Highway Construction, Automation in concrete technology	
4	**Drones and Robotics in Construction**	**13**
	Drones: Photogrammetry, Project Monitoring- real time data, aerial mapping, land survey, quantity survey, quality survey, structural health monitoring survey, under water survey. Robotics: Introduction, Benefits of Robotics in construction industry with respect to time, cost, quality, safety. Robotics Applications: Brick laying, Demolition, Material Handling, Structural steel cutting, Rebar tying/bending, Form work production, 3D printing parts and objects of homes, buildings, bridges and roads	
5	**Introduction to Advanced Technologies**	**04**
	Building Information Modeling (BIM), Virtual Reality (VR), Augmented Reality	
	Total	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	25%	20%	25%	10%	10%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lectures will be taken in class room with the use of multi-media presentations, black board – mix of both.
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
4. Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.

Recommended Study Material

1. Construction Project management, Theory & Practice, Kumar Neeraj Jha, Pearson Education India.
2. Construction Planning, Methods and Equipment, R.L Peurifoy, McGraw Hill, 2011
3. Construction equipment and its planning and application Mahesh Varma Metropolitan Book Co
4. BIM and Construction Management: Proven Tools, Methods, and Workflows By Brad Hardin, Dave McCool, John Wiley & Sons
5. Enhancing BIM Methodology with VR Technology, Open access peer
6. Robotics and Automation in Construction, Open access peer- reviewed edited volume
7. Automation in Construction Management: Automated management of Construction Materials Using RFID Technology, Javad Majrouhi Sardroud, Scholars' Press