Assistant Surveyor: Roads

01CI0410

Objective of the Course:

- To ensure precise and accurate data collection through the use of surveying instruments like total stations, GPS equipment, and levels..
- To set up and maintain control points at known locations to provide reference points for all surveying activities throughout the project.
- To conduct topographic surveys to create digital terrain models (DTMs) that represent the existing ground conditions. This information is essential for road design and construction planning.
- To collect data on road cross-sections at various points along the road, helping with earthwork calculations and pavement design.

Credit Earned: 0

Prerequisite: Basic Surveying Terms

Students learning outcomes:

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

1. Demonstrate Advanced knowledge of surveying techniques and instruments in Road Construction and Maintenance.
2. Show temporary adjustment of survey instruments as per standard methods.
3. Determine precise levelling and alignment for road alignment using Total Station.
4. Analyze and interpret survey data for roads alignments and its cross section elements.
5. Estimate the quantities of earth works and evaluate the abstract cost for road works.

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)	
00	00	02	00	00	00	00	50	00	00

Detailed Syllabus

Sr. No	Topic Name	Hours
1	**Define the Project Scope:**	**2**
	1.1 Clearly define the scope of the road construction project, including the length, width, and design specifications of the road.	1
	1.2 Identify any specific survey points or control points that need to be established for accurate measurements.	1
2	**Set Up the Total Station:**	**4**
	2.1 Choose a suitable location for the total station, ensuring it has a clear line of sight to the survey area	2
	2.2 Level the total station and calibrate it to ensure accurate measurements.	2
3	**Establish Control Points**	**4**
	3.1 Set up survey control points at known locations. These points will serve as reference points for your measurements.	2
	3.2 Measure the coordinates (X, Y, and Z) of these control points accurately. Point	2
4	**Collect Field Data & Data Processing**	**8**
	4.1 Use the total station to collect field data, including distances, angles, and elevations, by measuring various points along the road alignment.	2
	4.2 Record data for important features like centerline, cross-sections, and key design points	2
	4.3 Transfer the field data from the total station to a computer or data collector device	2
	4.4 Process the collected data using surveying software to compute distances, angles, and elevations. This may involve reducing raw measurements to coordinate values	2
5	**Create a Digital Terrain Model (DTM) & Design the Road**	**04**
	5.1 Use the processed data to create a digital terrain model of the project area. This model represents the existing topography and can be used for design and quantity calculations	2
	5.2 Utilize engineering software to design the road based on project specifications and regulatory requirements. The DTM will be an essential input for the design process.	2
6	**Calculate Quantities & Cost Estimation**	**08**
	6.1 Calculate the quantities of materials required for construction, such as earthwork, pavement, drainage systems, and utilities	2

	6.2 Estimate the costs associated with materials, labor, equipment, and other construction-related expenses based on the calculated quantities.	2
	6.3 Consider additional costs like permits, engineering fees, and contingencies	2
	6.4 Verify that the estimate aligns with industry standards and local construction practices.	2
	Total (Practical Hours)	**30**
7	**Industrial Visit/ Field exposure**	**04**
	Total	**34**

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
00%	10%	35%	30%	15%	10%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Attendance is compulsory in laboratory, which carries a 5% component of the overall evaluation.
3. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in laboratory.
4. All practical's will be performed in the field with the supervision of laboratory in charge.

Recommended Study Material

1. Surveying Vol. I & II by Duggal, S. K., Tata McGraw Hill Publication, New Delhi.
2. Surveying & Levelling by Subramanian, R., Oxford University Press, New Delhi.
3. Surveying and Levelling Vol. I & II by Kanetkar, T.P. and Kulkarni, S.V., Pune Vidhyarthi Gruh.
4. Surveying Vol. I, II & III by Arora, K.R., Standard Book House, New Delhi.
5. Surveying and Levelling by Basak, N.N., Tata Mcgraw Hill, New Delhi.
6. Surveying and Levelling by Agor, R., Khanna Publishers, New Delhi.
7. Advanced Surveying by Agor, R., Khanna Publishers, New Delhi.
8. Fundamentals of Surveying by Roy, S.K., Prentice Hall India, New Delhi.