

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)

M.Tech. (Second Semester - Regular) Examinations, May – 2026
24MCTPC12001– Construction Equipment and Methods



Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A**(2 x 5 = 10 Marks)**Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Mention any two factors affecting the performance of earthmoving equipment.	CO1	K1
b. Differentiate between single-acting and double-acting pile driving hammers.	CO2	K1
c. Write any two uses of centrifugal pumps in construction projects.	CO3	K1
d. What are transit mixers? State their function in concrete works.	CO4	K1
e. List any four material handling equipments used in construction industry.	CO5	K1

PART – B**(10 x 5 = 50 Marks)**Answer **ALL** the questions

	Marks	CO #	Blooms Level
2. a. Differentiate between front shovel and backhoe (hoe) with respect to working principle, digging position and typical applications in the field.	5	CO1	K2
b. List any five important factors influencing the selection of an excavator for a large earthwork project and briefly state why each factor is important.	5	CO1	K2
(OR)			
c. A contractor has to excavate a canal in soft clay with restricted space on one side. Justify the selection of a suitable combination of excavating equipment for this work, stating reasons.	5	CO1	K2
d. Sketch and explain the typical working cycle of a wheel loader used for loading dump trucks at a borrow pit.	5	CO1	K2
3.a. A crawler front shovel has a heaped bucket capacity of 2.0 m ³ , a cycle time of 0.5 min and an operating efficiency of 0.8. Compute its hourly production in m ³ of bank material. State the assumptions clearly.	5	CO2	K3
b. A hydraulic hoe (backhoe) excavates a trench using a 0.75 m ³ bucket with a bucket fill factor of 0.9 and a cycle time of 0.4 min. Calculate the hourly output if job efficiency is 50 min per hour.	5	CO2	K2
(OR)			
c. A wheel loader with 3.5 m ³ bucket capacity is loading loose soil into trucks. Given suitable data on cycle time and job efficiency (assume reasonable values), develop a general expression for hourly production and illustrate with a numerical example.	5	CO2	K3
d. Discuss how swing angle, depth of cut and job layout affect the productivity of a shovel. Support your answer by indicating how you would modify the layout to improve production.	5	CO2	K4
4.a. Define soil compaction and state its objectives in highway and embankment construction. List the ill-effects of inadequate compaction.	5	CO3	K4

- b. Explain the concept of the Proctor compaction test and draw a typical compaction curve. Discuss the significance of optimum moisture content and maximum dry density. 5 CO3 K2
- (OR)
- c. A lime-stabilized base course has developed cracks and loss of strength after one monsoon. Analyse possible reasons related to materials, mix proportioning and construction practices. 5 CO3 K3
- d. For a given embankment layer of specified thickness and compaction requirement, formulate a method to estimate the number of roller passes and total time needed using typical roller data. 5 CO3 K2
- 5.a. Explain the purpose and uses of an earthwork mass diagram in planning highway excavation and embankment operations. 5 CO4 K2
- b. Using hypothetical chainage and cumulative volume data for a road project, sketch a mass diagram and show how cut–fill balancing and haul distances are interpreted from it. 5 CO4 K2
- (OR)
- c. For a two-lane highway construction project in rolling terrain, prepare a broad earthwork plan showing sequence of operations (clearing, excavation, hauling, compaction) and proposed equipment for each stage. 5 CO4 K3
- d. Justify the choice between balancing cut and fill within the project limits versus importing material from borrow areas, considering economic, environmental and construction aspects. 5 CO4 K2
- 6.a. Classify pumps commonly used in construction (reciprocating, centrifugal, diaphragm, submersible, etc.) and briefly mention the principle and typical use of each type. 5 CO5 K3
- b. Explain the layout and working of a well-point dewatering system used for lowering groundwater around deep excavations. 5 CO5 K2
- (OR)
- c. For a multi-storey building project, analyse the relative merits and limitations of using a tower crane versus a mobile crane for material handling of reinforcement, formwork and concrete buckets. 5 CO5 K2
- d. A precast yard supplies heavy precast beams and slabs to a bridge site. Recommend an integrated material-handling system using conveyors, builder's hoists, forklifts and cranes, and justify your selection based on safety and efficiency. 5 CO5 K3

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