

Civil Engineering

Paper -II

Time allowed : Three hours

Maximum Marks: 300

Note: Attempt **Five** questions. Minimum two questions to be answered from each part; however question number **2** and **6** are compulsory.

PART - A

1. a. State various characteristics of good timbers and describe various uses of timber. [30]
b. State properties of good bricks and describe various tests for bricks. [30]
2. What is the cost owning and operating a construction equipment? How will you determine the hourly cost of construction equipment? [60]
3. What are the various methods of tacheometry? Explain in brief. [60]
4. Write detail Comparison between Rigid and Flexible Pavements? [60]

PART-B

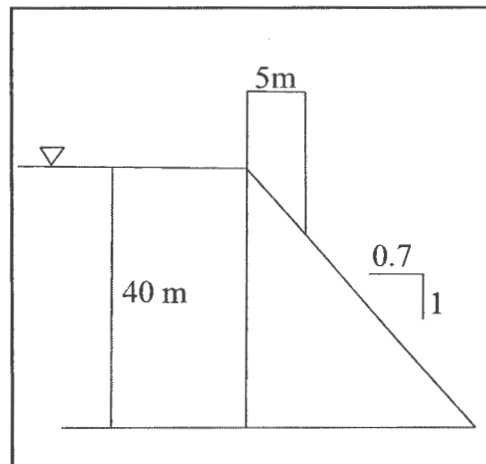
5. a. Explain the methods of obtaining average rainfall over a catchment. Write their merits and demerits. [20]
b. The following are the ordinals of the flood hydrograph from a catchment area of 780 sq km due to 6h storm. Drive the 12 h unit hydrograph. [20]

Time (h)	6	12	18	24	30	36	42	48	54	60	66	72	78
Discharge	40	64	215	360	405	350	270	205	145	100	70	50	40

- c. What is channel routing? Develop the channel routing equation [20]

P.T.O.

6. a. Explain how to access the storage capacity of a reservoir. Use appropriate diagram. [20]
- b. Design an irrigation unlined canal with the following data $Q=60 \text{ m}^3/\text{s}$, $d_{50}=1 \text{ mm}$. Draw the section of designed canal. [20]
- c. A gravity dam is shown below consider (1) hydrostatic force (2) self weight (3) full uplift [20]



7. Define BOD and how it is determined? [60]
8. Why the analysis of sewage is necessary? Describe the method of collecting sample of sewage. [60]

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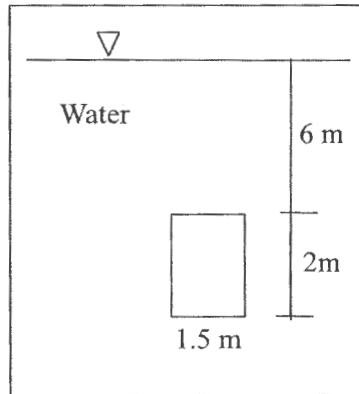
PART - A

1. Define second moment of inertia and find out the Centroidal moment of Inertia of a circular section with general notification. [60]
2. A three hinged parabolic arch of 20 m span and 4 m central rise carries a point load of 4 kN at a 4 m horizontally from left hand hinge. Calculate the normal thrust and shear force at the section under the load. Also, calculate the maximum B.M. positive and negative. [60]
3. a. Differentiate between Riveted connection and Welded connection. [30]
b. Define plastic theory in steel connections. [30]
4. Design a doglegged stair comprising a straight flight of steps, supported between two stringers beams along the two sides. Assume an effective span 1.5m; a rise of 150 mm and a tread of 270 mm. assume a live load of 3kN/m^2 . Use M20 concrete and Fe 415 steel and mild exposure conditions. [60]

P.T.O.

PART-B

5. A sluice gate 2m X 1.5 m is immersed water as shown below. Determine the total water force and its point of application. Take specific weight of water as 9.810 N/m^3 . [60]



6. Develop the expression of Y_2/Y_1 for hydraulic jump over horizontal channel. [60]
7. A natural soil deposit has a bulk unit weight of 18 kN/m^3 and water content of 5 percent. Calculate the amount of water required to be added to 1 cubic meter of soil to rise the water content 15 percent. Assume that the void ratio to remain constant. What will then be the degree of saturation? Take $G = 2.7$ [60]
8. The consistency limits of a soil samples are : Liquid Limit 52%, Plastic Limit 32%, Shrinkage Limit 17%, if the specimen of soil shrinks from a volume as 10 cm^3 at the liquid limit to 6.01 cm^3 at the shrinkage limit, calculate the specific gravity of solids. [60]