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B.Tech. 4th Semester, (Civil. Engg.) G-Scheme

Examination, May–2024

HYDRAULICS ENGINEERING

Paper–PCC-CE-202-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Question 1st is compulsory. Attempt total five questions selecting one question from each section. All questions carry equal marks.*

1. Explain following terms (2.5×6)

(a) Total Energy Line
(b) Momentum Correction Factor
(c) Hydraulic mean Depth
(d) Sketch the Shear stress distribution across a section of pipe.
(e) Gradual varied flow
(f) Name the different forces present in fluid flow

Unit-I

2. (a) Prove that the maximum velocity in the circular pipe for viscous flow is equal to two times the average velocity of flow. 7.5

(b) A laminar flow is taking place in a pipe of diameter 200 mm. The maximum velocity is 1.5m/s. Find the mean velocity and the radius at which this occurs. 7.5

3. Obtain an Expression for velocity distribution in turbulent flow for (i) smooth pipe and (ii) rough pipes. 15

Unit-II

4. Find the maximum power transmitted by a jet of water discharging freely out of nozzle fitted to a pipe = 300 m long and 100 mm diameter with co-efficient of friction as 0.01. The available head at the nozzle is 90 m. 15

5. A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Take $f = 0.01$ for both sections of the pipe. 15

Unit-III

6. Determine the maximum discharge of water through a circular channel of diameter 1.5 m when the bed slope of the channel is 1 in 1000. Take C = 60. 15

7. Derive an expression for Depth of hydraulic jump. 15

Unit-IV

8. Prove that the loss of energy head in a hydraulic jump is equal to $(d_2-d_1)^3/d_1 d_2$, where d_1 and d_2 are the conjugate depths. 15

9. A 300 mm diameter pipe carries water under a head of 20 meters with a velocity of 3.5 m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of the resultant force at the bend. 15

B. Tech. (Civil) 4th Semester, (G-Scheme) Examination, May–2024

DESIGN OF CONCRETE STRUCTURE

Paper–PCC-CE-204-G

Time allowed : 3 hours] *[Maximum marks : 75*

Before answering the questions, candidates should enure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : *Attempt **five** questions in all, selecting at least **one** question from each section. **Question No.1 is compulsory.** All questions carry equal marks.*

1. Describe the following : 15

(a) Slenderness ratio

(b) Assumption of limit state

(c) Water cement ratio

(d) Limit state of serviceability

(e) Factors affecting the strength of concrete

Section-A

2. (a) Explain the principles of concrete mix design. What are the various factors governing the selection of mix proportion according to Indian standard? 7.5

(b) Write the short note on the durability of concrete. 7.5

3. Determine the moment of resistance of a singly reinforced 150mm wide and 300mm deep (effective) beam. The reinforcement consists of 4 bars of 16mm diameter. The material used is M15 concrete and Fe 250steel. Take m=18. If the span of the beam is 5m, find the maximum distributed load which the beam can carry, inclusive of its own weight. 15

Section-B

4. (a) Write a short note on steel beam theory. 7.5

(b) A rectangular beam section is reinforced on both side is 350mm wide and having 600mm depth. The centre of steel on both side is 40 mm away from respective edges. Determine the steel area on both side for a bending moment of 70kN. Solve by working stress method. 7.5

5. Design a simple supported beam to carry a load of 14500N/m. The clear span of beam is 5.5m. The bearing on each end is 300 mm. Assume permissible nominal shear stress as 0.3N/mm^2. Solve it by limit state. 15

Section-C

6. (a) What are requirements of a good detailing in RCC? 7.5

(b) Write a short note on spacing of reinforcement in slab. 7.5

7. Design a simply supported slab supported on masonary wall with following details: 15

Clear span = 4m live load = 3000N/m^2

modification factor = 1.4 nominal shear stress = 0.3N/mm^2. 15

Section-D

8. A square column 450mm × 450mm supports a total load of 1600 kN. Design the column and a square footing for this column. The safe bearing capacity of soil is 200kN/m^2. 15

9. A RCC cantilever type retaining wall is having 5.5m stem. The wall retains soil level with its top. Soil density is 16000N/m^3 and has angle of repose = 30°. The safe bearing of soil is 21000 N/m^2. Design the retaining wall. 15