1032

Code : 15CE-41T

Register Number

HYDRAULICS

Time : 3 Hours | | Max. Marks : 100

Note : (i) Answer any **six** full questions from Section-I, each question carries **5** marks.

(ii) Answer any **seven** full questions from Section-II, each question carries **10** marks.

SECTION - I

1. Define (i) Density, (ii) Specific weight. State their units.   5

2. Distinguish between intensity of pressure and pressure head.   5

3. State 'Bernoulli's theorem' and list the applications of Bernoulli's theorem.   5

4. Differentiate between steady flow and unsteady flow.   5

5. List the different types of weirs.   5

6. Enumerate the different types of energy losses in a pipeline.   5

7. Explain the significance of surge tank with the aid of neat sketch.   5

8. Define : (i) Natural channels

    (ii) Open channel

    (iii) Wetted area

    (iv) Wetted perimeter

    (v) Hydraulic radius $1 \times 5 = 5$

9. Explain the term "Most economical channel section". State the conditions for most economical trapezoidal channel section.   5

SECTION – II

10. (a) Convert the pressure head of 500 mm of oil of specific gravity 0.8 to a equivalent head of water.   5

(b) A simple manometer is used to measure the pressure of water flowing in a pipeline, its right limb is open to atmosphere and the left limb is connected to the pipe. The centre line of pipe is in level with that of mercury in the right limb. Determine the pressure in the pipe. If the difference of mercury levels in the two limbs is 150 mm.   5

11. Determine the total pressure and depth of centre of pressure on an isosceles triangular plate of base 4 m and altitude 6 m, when it is immersed vertically in water such that its base touches the water surface.   10

12. (a) Compute the velocity ratio between two sections of a tapering pipe, if the diameter ratio is 1 : 2. When the liquid is flowing continuously through the pipe.   4

(b) The diameter of pipe changes from 200 mm at section 6 m above datum to 50 mm at a section 3 m above datum. The pressure of water at first section is 200 kPa and the velocity of flow is 2 m/s. Determine the intensity of pressure at the second section.   6

13. A horizontal venturimeter with 200 mm diameter at inlet and 100 mm diameter at throat is used for measuring the flow of water. The differential mercury manometer shows a gauge difference of 250 mm. Find the discharge in lit/s. Take $C = 0.98$ 10

14. (a) Explain "Veena contracta" with the aid of sketch.   5

(b) Differentiate between mouth piece running free and mouth piece running full.   5

15. Water discharges at the rate of 100 lit/sec. through a 120 mm diameter sharp edged orifice under a constant head of 10 m. A point on the jet measured from veena contracta has co-ordinates of 4.5 m horizontal and 0.54 m vertical. Calculate the values C_c, C_v and C_d for the orifice.   10

16. During an experiment in a laboratory 300 lit of water flowing over a right angled notch was collected in one minute. If the head of water over the apex of the notch is 100 mm. Calculate the co-efficient of discharge.   10

17. A reservoir has been built 4 km away from the college campus having 6000 inhabitants, water is supplied from the reservoir to the campus. It is estimated that each inhabitant will consume 200 lit of water per day and half the daily supply is pumped within 8 hrs. Calculate size of the supply main if the loss of head due to friction in pipeline is 20 m. Take f = 0.01.   10

18. A channel of rectangular section 6 m wide carries water at the rate of 30 m³/s at a depth of 1.8 m. Calculate bed slope of the channel. Given Mannings N = 0.01.   10

19. (a) List the classifications of hydraulic turbines.   5

    (b) Explain the working principles of centrifugal pump.   5