

V- SEM /CIVIL[PT]/ 2021(W)

TH3- Hydraulics and Irrigation Engineering

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2 Figures
in the right hand margin indicates marks

1. Answer All questions 2 x 10
- a. Define specific volume.
 - b. State and explain Pascals law.
 - c. State the relationship between absolute, gauge, atmospheric and vaccum pressure.
 - d. What is reynold number?
 - e. Write down the assumption in Bernoulli's equation.
 - f. Define hyetograph.
 - g. Find the delta for a crop when it's duty is 864 hectares/cumecs on the field , the base period is 120days..
 - h. Define free board.
 - i. What is scouring in canals.
 - j. Define a dam.
2. Answer Any Six Question. 5X6
- a. A plate 0.0254mm distant from a fixed plate moves at 61 cm/sec requires a force of 0.2kgf/m^2 to maintain the speed. Determine the dynamic viscosity between the plate.
 - b. The right limb of a sample U tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of sp.gravity 0.9 is flowing. The centre of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm..
 - c. Determine total pressure on a circular plate of diameter 1.5m which is placed vertically in water such that the centre of plate is 3m below the free surface of water. Find the position of centre of pressure also.
 - d. Define duty and derive the relationship between Duty, Delta and base period.
 - e. Describe different types of losses in canal.
 - f. Draw the cross section of canals partially cutting and partially in filling.
 - g. Write down the function and necessity of a fish ladder in diversion headwork with sketch.

- 3 The water is flowing through a pipe having diameter 20cm and 10cm at section 1 and 2 respectively. The rate of flow through pipe is 35lt/sec. The section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24N/cm^2 , find intensity of pressure at section 2. 10
- 4 A centrifugal pump having outer diameter two times equal to the inner diameter and running at 1000 rpm works against a total head of 40m. The velocity of flow through the impeller is constant and equal to 2.5m/sec. The vanes are set back at an angle of 40° at outlet. If the outer diameter of the impeller is 500mm and width at outlet is 50mm determine
- vane angle at outlet
 - work done by impeller on water per sec.
 - manometric efficiency.
- 5 Define different causes and control of waterlogging. 10
- 6 Write down the functions and necessity of Aqueduct, Syphon aqueduct, superpassage and level crossing with sketches. 10
- 7 Write down the causes of failure of Earthen Dams with sketches. 10

III-SEM./CIVIL/2021(W) OLD

CET 302 Fluid Mechanics and Hydraulic Machine

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2
Figures in the right hand margin indicates marks

1. **Answer All questions** 2 x 10
- a. Define viscosity and write down its unit in C.G.S system.
 - b. Define density and its unit.
 - c. Write down the relationship between atmospheric pressure, absolute pressure and gauge pressure.
 - d. What is Archimedes principle?
 - e. Define discharge and its unit.
 - f. What is notch and write down its uses.
 - g. Write down Darcy Weisbatch formula.
 - h. What are the main parts of a centrifugal pump?
 - i. What is mechanical efficiency of a centrifugal pump? Write down its mathematical formula.
 - j. What is the difference between poise and stoke?
2. **Answer Any Six Questions** 6 x 5
- a. Derive continuity equation.
 - b. Derive expression for total pressure exerted on vertical surface.
 - c. Find the volume of the water displaced and position of centre of buoyancy for a wooden block of width 2.5 m and of depth 1.5 m, when it floats horizontally in water. The density of wooden block is 650 kg/m^3 and its length is 6 m.
 - d. Describe hydraulic gradient line and total energy line.
 - e. Derive an expression for the meta centric height of a floating body.
 - f. Write down the statement and mathematical formula for the loss of head due to sudden enlargement and sudden contraction of a pipe.
 - g. A pipe, through which water is flowing, is having diameters 20 cm and 10 cm at the cross section 1 and 2 respectively. The velocity of water at section 1 is given as 4.0 m/sec. Find the velocity head at sections 1 and 2 and also rate of discharge.
3. State and prove Bernoulli's equation. 10
4. Briefly describe different parts of a centrifugal pump. 10
5. A single acting reciprocating pump running at 50 rpm, delivers $0.01 \text{ m}^3/\text{sec}$ of water. The diameter of the piston is 200 mm and stroke length is 400 mm. Determine 10
- (i) The theoretical discharge of the pump.
 - (ii) Coefficient of discharge
 - (iii) Slip and percentage slip of the pump.
6. Derive the discharge formula for venturimeter. 10
7. Describe different types of flow through pipe 10
- (i) Steady and unsteady flow
 - (ii) Uniform and non uniform flow
 - (iii) Laminar and turbulent flow
 - (iv) Compressible and incompressible flow