C

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Property of fluid by which its own molecules are attracted is called   CO1- U

   a) Adhesion   b) Cohesion   c) Viscosity   d) Compressibility

2. Bernoulli's theorem deals with the law of conservation of   CO1- U

   (a) Mass   (b) Momentum   (c) Energy   (d) None of the above

3. What are the dimensions of force?   CO1- U

   (a) $[M L T^{-2}]$ (b) $[M L T^{-1}]$ (c) $[M L^2 T^{-2}]$ (d) $[M L^2 T^2]$

4. A liquid flows through pipes 1 and 2 with the same flow velocity. If the   CO2- App
   ratio of their pipe diameters d1 : d2 be 3:2, what will be the ratio of the head
   loss in the two pipes?

   (a) 3:2   (b) 9:4   (c) 2:3   (d) 4:9

5. The thickness of laminar boundary layer at a distance 'X' from the leading   CO1- U
   edge over a flat varies as

   (a) X   (b) $X^{1/2}$ (c) $X^{1/5}$ (d) $X^{4/5}$

PART – B (5 x 3= 15 Marks)

6. What is a fluid? How are fluids classified?   CO1- U

7. What is venturimeter? Write the main parts of Venturimeter.   CO2- App

8. State Buckingham's π theorem.   CO3- App

9. Define critical velocity   CO4- App

10. What are the different methods of preventing the separation of boundary layers? CO6- App

<div align="center">PART – C (5 x 16= 80Marks)</div>

11. (a) A 400 mm diameter shaft is rotating at 200r.p.m. in a bearing of CO1- U (16) length 120mm. If the thickness of oil film is 1.5 mm and the dynamic viscosity of the oil is 0.7 Ns/m^2. Determine the torque required to overcome friction in bearing and power utilized in overcoming viscous resistance. Assume a linear velocity profile.

<div align="center">Or</div>

(b) A trapezoidal channel 2m wide at the bottom and 1m deep has side CO1- U (16) slope 1:1 determine the Total pressure and Centre of pressure on the vertical gate closing the channel when its full of water

12. (a) Briefly describe about velocity potential function and stream CO2- App (16) function and its relations

<div align="center">Or</div>

(b) A 30cm diameter pipe conveying water branches into two pipes of CO2- App (16) diameters 20cm and 15 cm respectively. if the average velocity in the 30cm diameter pipe is 2.5m/s.Find the discharge in the pipe, also determine the velocity in 15cm pipe .if the average velocity in 20cm diameter pipe is 2m/s

13. (a) Discuss about Buckingham's π theorem. State the procedure for CO3- App (16) solving problems.

<div align="center">Or</div>

(b) Using Buckingham's π theorem, show that the velocity through a CO3- App (16) circular orifice is given by $v = \sqrt{2gH}\left[\dfrac{D}{H}, \dfrac{\mu}{\rho vH}\right]$, where H is the head causing flow, D is the diameter of the orifice, μ is the coefficient of viscosity, ρ is the mass density and g is the acceleration due to gravity.

14. (a) Examine the head lost due to friction in a pipe of diameter 300mm CO2- App (16) and length 50m, through which water is flowing at a velocity of 3m/s using (i) Darcy formula, (ii) Chezy's formula for which C = 60

<div align="center">Or</div>

(b) The difference in water surface levels in two tanks, which are CO2- App (16) connected by three pipes in series of lengths 300m, 170m, 210m and

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of diameters 300mm, 200mm and 400 mm respectively, is 12m. Determine the rate of flow of water if coefficient of friction are 0.005, 0.0052 and 0.0048 respectively, considering minor losses also.

15. (a) A Thin plate is an atmosphere air at a velocity of 5m/s. The length of the plate is 0.6m and width is 0.5m. Calculate the thickness of the boundary layer at the end of the plate and the drag force on one side of the plate. Take the density of air is as $1.24kg/m^3$ and kinematic viscosity as $0.5 \times 10^{-4} \ m^2/s$ CO2- App   (16)

Or

(b) Determine the thickness of boundary layer at the end of the plate and the drag force on one side of a plate 1 m long and 0.8m wide when placed in water flowing with a velocity of 150mm per second .Calculate the value of coefficient of drag. Take kinematic viscosity =0.01 poise   CO2- App   (16)

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