

ANSWER ALL QUESTIONS

11. a) Define a fluid and discuss briefly about the various classifications of fluids.

(OR)

b) Write short notes on:

(i) System and Fluid particles

(ii) Control volume

12. a) Describe with the help of neat sketches different types of manometers.

(OR)

b) A two velocity components are given in the following cases, find the third component such that they satisfy the continuity equation.

(i)  $u = x^3 + y^2 + 2z^2$  ;  $v = -x^2y - yz - xy$ ;

(ii)  $u = \log(y^2 + z^2)$  ;  $v = \log(x^2 + z^2)$ ;

(iii)  $u = \frac{-2xyz}{(x^2 + y^2)^2}$  ;  $w = \frac{y}{(x^2 + y^2)}$

Max. Marks: 100

PART - A

(10 x 2 = 20 Marks)

ANSWER ALL QUESTIONS

1. Define viscosity.
2. Define elasticity of a body?
3. Explain the term metacentre.
4. Define a rotational flow and irrotational flow.
5. What do you understand about moody diagram? How it is useful for the pipes.
6. Explain the term laminar flow.
7. Why are the pipes connected in parallel?
8. What are the methods adopted for controlling the boundary layer?
9. Mention at least two uses of dimensional analysis.
10. State Buckingham's  $\pi$  theorem.

13. a) (i) A venturimeter has its axis vertical, the inlet and throat diameters being 150 mm and 75 mm respectively. The throat is 225mm above inlet and  $k = 0.96$  petrol of specific gravity 0.78 flows up through the meter at a rate of  $0.029\text{m}^3/\text{s}$ . Find the pressure difference between the inlet and the throat. (8)

(ii) A venturimeter is to be fitted in a pipe 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is  $8.1\text{m}^3$  per minute. Find the least diameter of the throat to ensure that the pressure head does not become negative. Take  $k = 0.96$ . (8)

(OR)

b) (i) Derive an expression for Darcy –Wiesback equation for head loss in pipe due to friction (10)

(ii) Distinguish between Laminar flow and turbulent flow in pipes. (6)

14. a)(i) What do you understand by displacement thickness and momentum thickness? (4)

(ii) Explain pipe Network system.

(iii) Write short notes on: (1) Pipes in series (4)

(2) Pipes in parallel (8)

(OR)

14. b) (i) A pipe line 0.225m in diameter and 1580m long has a slope of 1 in 200 for the first 790m and 1 in 100 for the next 790m. The pressure at the upper end of the pipe line is  $107.91\text{ kN/m}^2$  and at the lower end is  $53.955\text{ kN/m}^2$ . Taking  $f = 0.032$ , determine the discharge through the pipe. (8)

(ii) For the distribution main of a city water supply a 0.30 m main is required, as pipes above 0.25 m diameter are not available, it is decided to lay two parallel mains of same diameter. Find the diameter of the parallel mains. (8)

15. a) What are the types of similarities in similitude models? Explain in detail.

(OR)

b) The equation for specific speed for a turbine is given by

$$N_s = \frac{N\sqrt{P}}{H^{5/4}}$$

By  $\pi$  theorem and using variables such as power  $P$ , speed  $N$ , head  $H$ , diameter  $D$  of the turbine, density  $\rho$  of the fluid and acceleration due to gravity  $g$ , deduce the above expression for  $N_s$ .

\*\*\*\*\*THE END\*\*\*\*\*