R16

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Regular & Supplementary Examinations Nov/Dec 2018
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r. p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm.   7M

   b Explain the phenomenon of capillarity. Obtain an expression for the capillary rise of liquid.   5M

OR

2 **a** Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3 m below the free surface of water. Find the position of centre of pressure also.   7M

   b Define pressure. Obtain an expression for the pressure intensity at a point in a fluid.   5M

UNIT-II

3 **a** Explain the classification of fluid flow.   7M

   b The stream function for a two dimensional flow is given by $\Psi = 2xy$. Find the velocity potential function Φ.   5M

OR

4 **a** Derive the Bernoulli's energy equation for steady, incompressible fluid flow.   7M

   b Explain the terms: Hydraulic gradient line and Energy gradient line.   5M

UNIT-III

5 **a** The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if friction factors are 0.02, 0.0208 and 0.0192 respectively, neglecting minor losses.   7M

   b List the various minor losses in pipe flow and give expressions for the same.   5M

OR

6 **a** Derive the Darcy-Weisbach equation for head loss due to friction in pipes.   7M

   b What is a syphon? Explain its principle of working with a neat sketch.   5M

UNIT-IV

7 **a** An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$.   7M

   b What is a Pitot – tube? Why is it used? What is the difference between Pitot - tube and Pitot - static tube?   5M

OR

8 **a** Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right - angled weir .The discharge co-efficients of the rectangular and triangular weirs are 0.62 and 0.59 respectively. Find the depth of water over the triangular weir.   7M

   b Define an orifice and a mouth piece. Explain the difference between the two.   5M

UNIT-V

9 **a** Prove that the maximum velocity in a circular pipe for laminar flow is equal to two times the average velocity of the flow.   7M

   b An oil of viscosity 10 poise flows between two parallel fixed plates which are kept at a distance of 50 mm apart. Find the rate of flow of oil between the plates if the drop of pressure in a length of 1.2 m is 0.3 N/cm^2. The width of the plates is 200 mm.   5M

OR

10 **a** Explain the separation of boundary layer with a neat sketch.   7M

    b Explain 'drag' and 'lift'.   5M

*** END ***