Code: 9A01304

R09

B.Tech II Year I Semester (R09) Supplementary Examinations June 2017

FLUID MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Explain about Diaphragm gauges along with neat sketch.

(b) Explain about Bellow gauges along with neat sketch.

2 A circular gate in a vertical wall has a diameter of 8 m. The water surface on the upstream side is 16 m above the top of the gate and on the downstream side 2 m above the top of the gate. Find the forces acting on the two sides of the gate and the resultant force acting on the gate and its location.

3 (a) Velocity for a two dimensional flow field is given by $V = (6+2xy+t^2)i+(xy^2+10t)j+25\ k$. Find the acceleration of a particle at (3, 0, 2) at time t = 1.

(b) Explain about Path line.

4 A pipe line, 600 mm diameter carrying oil of specfic gravity 0.85 at the flow rate of 1800 lit/s has a 90° bend in the horizontal plane. The pressure at the entrance to the bend is 1.471 bars and loss of head in the bend is 2 m of oil. Find the magnitude and direction of the force exerted by the oil on the bend.

5 Prove that the momentum thickness and energy thickness for boundary layer flows are given by $\theta = {}_0\int^{\delta} u/U(1-u/U).dy$ and $\delta^{**} = {}_0\int^{\delta} u/U(1-u^2/U).dy(M)$

6 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 be 0.3 N/cm^2.The width of the plates is 200 mm.

7 (a) Explain variation of friction factor with Reynold's number.

(b) Explain Hydraulic gradient line and total energy lines.

8 (a) Mention the advantages and limitations of an orifice as a flow metering device.

(b) An orifice plate of diameter 10 cm has been fitted into a 25 cm diameter pipe that conveys oil of specific gravity 0.8.The pressure difference on the two sides of the orifice plate is measured by a mercury-oil differential manometer .If the gauge shows a deflection of 80 cm of mercury, calculate the oil discharge in liters per second. Take coefficient of discharge $C_d = 0.65$.

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