Govt. College of Engineering, Amravati

Unit test I   **Subject: Fluid Mechanics   Max. marks: 15**

Solve any three

Q.1 a .Define capillarity. Obtain an expression for capillary rise of liquid. (2)

b. The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 m/s requires a force of 98.1 N to maintain the speed. Determine:

i) the dynamic viscosity of oil in poise, and

ii) the kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95. (3)

Q.2 a. Define weight density and specific gravity. (2)

b. The pressure outside the droplet of water of diameter 0.04mm is 10.32 N/cm^2 (Atmospheric pressure). Calculate the pressure within the droplet if the surface tension is given as 0.0725 N/m of water..(3)

Q.3 a. Explain the terms :Absolute and atmospheric pressure. (2)

b. A circular plate 3.0 m diameter is immersed in water in such way that its greatest and least depth below the free surface are 4m and 1.5 m respectively. Determine the total pressure on one face of plate and position of the center of pressure.. (3)

Q.4 a. what is metacenter and metacentric height of floating body. (2)

b. Explain stable , unstable and neutral equilibrium with sketch and mentioned the criteria in terms of metacentric height for each equilibrium (3)

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Unit test I   Subject: Fluid Mechanics   Max. marks: 15

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Q.1 a .Define Vapour pressure and capillary fall (2)

b. Two large plane surfaces are 2.4 cm apart. The space between the surfaces is filled with glycerine. What force is required to drag a very thin plate of surface area 0.5 square meter between the two large plane surfaces at a speed of 0.6 m/s, if:

i) the thin plate is in the middle of the two plane surfaces, and

ii) the thin plate is at a distance of 0.8 cm from one of the plane surfaces? Take dynamic viscosity of glycerine = 8.10×10^{-1} NS/m2 .   (3)

Q.2 a. Define compressibility and specific gravity. (2)

b. Calculate the capillary effect in mm in a glass tube of 4 mm diameter, when immersed in i) water and ii) mercury. The values of surface tension of water and mercury at $20°$ C in contact with air a 0.073575 N/m and 0.51 N/m respectively. The angle of contact for water is zero and that for mercury is 130°.(3)

Q.3 a. State and prove Pascal law (2)

b. Determine the total pressure and center of pressure on an isosceles triangular plate of ba 4 m and altitude 4 m when immersed vertically in an oil of sp. Gravity 0.9. The base of the plate is coincides w the free surface of oil. (3)

Q.4 a. Define metacenter and metacentric height (2)

b.A solid cylinder of diameter 4 m has a height of 3 m. Find the metacentric height of th cylinder when it is floating in water with its axis vertical. The sp. Gravity of cylinder =0.6. (3)

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Winter 2016 | **Unit test I** | **Subject: Fluid Mechanics** | **Max. marks: 15**

Solve any three

viscosity

Q.1 a Discuss the classification of fluids based on fluids. (2)

b. Two large plane surfaces are 2.4 cm apart. The space between the surfaces is filled with glycerine. What force is required to drag a very thin plate of surface area 0.5 square meter between the two large plane surfaces at a speed of 0.6 m/s, if:

i) the thin plate is in the middle of the two plane surfaces, and

ii) the thin plate is at a distance of 0.8 cm from one of the plane surfaces? Take dynamic viscosity of glycerine = 8.10×10^{-1} N s/m². (3)

Q.2 a. Define bulk modulus of elasticity, specific weight and specific gravity. (3)

b. The capillary rise in the glass tube is not to exceed 0.2 mm of water. Determine its minimum size, given that surface tension for contact with air = 0.0725 N/m. (2)

Q.3 a. State and prove Pascal law of pressure. (2)

b. Determine the total pressure and center of pressure on an isosceles triangular plate of base 4 m and altitude 4 m when immersed vertically in an oil of sp. Gravity 0.9. The base of the plate is coincides with the free surface of oil. (3)

Q.4 a. Define stable and neutral equilibrium. (2)

b A solid cylinder of diameter 4 m has a height of 3 m. Find the metacentric height of the cylinder when it is floating in water with its axis vertical. The sp. Gravity of cylinder =0.6. (3)