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BICE-028

DIPLOMA IN MECHANICAL ENGINEERING

00927

Term-End Examination

June, 2013

BICE-028 : FLUID MECHANICS

Time : 2 Hours *Maximum Marks : 70*

Note : *Attempt total **five** questions in all. Question No **1** is **compulsory** and **four** questions are to be attempt out of questions no. **02 to 08**. Use of scientific calculator is **permited**. Assume missing data if any.*

1. Write the correct answer of the following : **7x2=14**

(a) Mercury does not wet glass. This is due to property of liquid known as :

(i) Adhesion (ii) Cohesion

(iii) Surface Tension (iv) Viscosity

(b) Meta centric height is the distance between the meta centre and :

(i) water surface

(ii) centre of pressure

(iii) centre of gravity

(iv) centre of buoyancy

(c) Equation of continuity results from the principle of conservation of :

(i) Energy (ii) Flow

(iii) Mass (iv) Momentum

(d) Hydraulic grade line for any flow system as compared to energy line is :

(i) Above (ii) Below

(iii) at some level (iv) None of these

(e) The total energy represented by Bernoulli's equation $\left[\frac{p}{w}+\frac{v^2}{2g}+z\right]$ has units :

(i) Nm/s (ii) Ns/m

(iii) Nm/m (iv) Nm/N

(f) Theoretical velocity of flow through an orifice is :

(i) $cd\sqrt{2gh}$ (ii) $2\sqrt{gh}$

(iii) $\sqrt{2gh}$ (iv) $h\sqrt{2g}$

(g) For a hydraulically efficient rectangular channel of bed width 4m, the depth of flow is :

(i) 2 (ii) $\frac{1}{2}$

(iii) 4 (iv) $\sqrt{2}$

2. (a) Explain terms dynamic viscosity and kinematic viscosity. Write their all possible units. 6

(b) Define surface tension and prove that the 8

$$\Delta P = \frac{4T}{D}$$

above terms have their usual meaning.

3. Develop Euler's equation of motion and then derive Bernoulli's equation and list out some practical applications. What are the limitations of Bernoulli's equation ? 14

4. (a) Define coefficient of velocity, coefficient of contraction and coefficient of discharge. Find out the relation among three. 7

(b) Describe the method for determining, coefficient of velocity experimentally. 7

5. (a) Name the minor and major losses during the flow of liquid through a pipe line. 6

(b) Derive a formula developed by Darcy for loss of head due to friction in the pipe. 8

6. (a) Water at a rate of 1.5 m^3/min is supplied through a pipe line of 30 cm diameter and 3000 m long to a reservoir which is 20 m above the axis of pipe. Take f = 0.01 for the pipe line. Find the power required. **6**

(b) Two tank 2.5 km long are connected by a pipe of 30 cm diameter. The water level difference between two tanks is 10 m. Find the diameter of another pipe which would provide twice the discharge of the first. consider 'f' is same in both cases and consider only frictional losses in both cases. **8**

7. (a) What is fundamental difference between flow through pipe and flow through open channel ? **4**

(b) Derive an expression for the discharge through an open channel using chezy's formula. **10**

8. Write short notes on **any four** of the following : **4x3.5=14**

(a) Water stammer

(b) types of fluids

(c) pipes in series

(d) Mouth piece

(e) Differential Manometer

(f) Density and specific gravity of a flow