| BICE-028 |

DIPLOMA IN MECHANICAL ENGINEERING

Term-End Examination

December, 2012   03448

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 attempted out of questions no. 2 **to** 8. Use of scientific calculators is permited. Assume missing data if any.*

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

    (a)   Viscosity of water in comparison to mercury is :

        (i)   Higher

        (ii) Lower

        (iii) Same

        (iv) Unpredictable

    (b)   If the Reynolds number is less than 2000, the flow in a pipe is :

        (i)   Laminar flow

        (ii) Turbulent flow

        (iii) Transition flow

        (iv) None of these

(c) Manometer is used to measure :

    (i)   Pressure in pipes, channels

    (ii)   Atmospheric pressure

    (iii) Very low pressure

    (iv) Velocity

(d) Which of the following equation is known as momentum principle ?

    (i) $F = \dfrac{d(m^2v)}{dt}$ (ii) $F = \dfrac{dv}{dt}$

    (iii) $F = \dfrac{d(mv)}{dt}$ (iv) $F = \dfrac{d(mv)}{dt^2}$

(e) Dynamic similarity between the model and prototype is the :

    (i)   Similarity of motion

    (ii)   Similarity of lengths

    (iii) Similarity of forces

    (iv) None of the above

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

    (i)   Above   (ii)   Below

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

(g) The boundary layer separation occurs when :

(i) $\dfrac{dp}{dx} < 0$

(ii) $\left(\dfrac{\delta u}{\delta y}\right)_{y=0} = 0$

(iii) $\left(\dfrac{\delta u}{dy}\right)_{y=0} < 0$

(iv) None of these

2. (a) (i) What is vapour pressure ? What is its significance in flow problems ?   5

(ii) State and explain the Newton's law of viscosity.   2

(b) Define vortex flow. Discuss the Forced vortex flow with examples.   7

3. (a) What are Differential Manometers ? Discuss the types of differential mnometers with neat sketch.   7

(b) State the Bernoulli's equation and explain the assumption made in Bernoulli's equation.   7

4. (a) Find the discharge from an 80 mm diameter external mouth piece, fitted to a side of a large vessel ; if the head over the mouthpiece is 6 m.   7

   (b) A pipeline 60 cm diameter bifurcates at a Y junction into two branches 40 cm and 30 cm in diameter. If the rate flow in the main pipe is 1.5 cumecs and mean velocity of flow in 30 cm diameter pipe is 7.5 m/s., determine the rate of flow, in the 40 cm diameter pipe.   7

5. (a) Find an expression for Time of Emptying the tank through a single orifice at Bottom or side.   7

   (b) Explain the phenomena of cavitation.   7

6. (a) Derive an expression for the discharge through an open channel using Chezy's formula.   10

   (b) What is fundamental difference between flow through pipe and flow through open channel ?   4

7. (a) Find the most economical crosssection of a rectangular channel to carry 0.5 m^3/s of water when channel slope is 1 in 1000. Take $C = 50$.   8

(b) A two kilometer pipe line carries the water 6
with a velocity of 1 m/s. Find out the
minimum diameter of the pipe required if
the head loss is limited to 15 m of water.
Take $f = 0.008$ (for pipe).

8. Write short notes on **any four** of the following :

(a) Dynamic and kinematic viscosity. 4x3.5=14

(b) Newtonian and Non - Newtonian fluid.

(c) Major and Minor losses.

(d) Practical application of momentum
equation.

(e) Limitations to Bernoullis equation.

(f) Density and specific gravity of a fluid.