## DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

### Term-End Examination

### June, 2015

00126

## BICE-028 : FLUID MECHANICS

*Time : 2 hours*                              *Maximum Marks : 70*

*Note : Attempt any **five** questions in all. Question no. 1 is **compulsory**. **Four** questions are to be attempted out of questions no. 2 to 7. Use of scientific calculator is permitted.*

1.  Write the correct answer of the following :          *7×2=14*

    (a) Stokes is the unit of

        (i)    surface tension

        (ii)   viscosity

        (iii)  kinematic viscosity

        (iv)   None of the above

    (b) Pitot tube is used for measurement of

        (i)    pressure

        (ii)   flow

        (iii)  velocity at a point

        (iv)   discharge

(c) The range for coefficient of discharge ($C_d$) for a venturimeter is

(i) 0·6 to 0·7

(ii) 0·7 to 0·8

(iii) 0·8 to 0·9

(iv) 0·95 to 0·99

(d) If the fluid particles move in a zigzag way, the flow is called

(i) unsteady

(ii) non-uniform

(iii) turbulent

(iv) incompressible

(e) Mouthpieces are used to measure

(i) velocity

(ii) pressure

(iii) viscosity

(iv) rate of flow

(f) Maximum efficiency of power transmission through pipes is

(i) 50%

(ii) 66·67%

(iii) 75%

(iv) 100%

(g) The flow in open channel is laminar, if the Reynolds number is

   (i) 2000

   (ii) less than 2000

   (iii) less than 500

   (iv) None of the above

2. (a) Differentiate between the following : 8

   (i) Absolute and Gauge Pressure

   (ii) Piezometer and Pressure Gauges

   (b) An oil of viscosity 5 poise is used for lubrication between a shaft and a sleeve. The diameter of the shaft is 0·5 m and it rotates at 200 r.p.m. Calculate the power lost in the oil for a sleeve length of 100 mm. The thickness of the oil film is 1·0 mm. 6

3. (a) What is Euler's equation of motion ? How will you obtain Bernoulli's equation from it ? 7

(b)   A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take $C_d = 0.98$.   7

4.   (a)   Explain the classification of orifices and mouthpieces based on their shape, size and sharpness.   7

(b)   A convergent-divergent mouthpiece having throat diameter of 60 mm is discharging water under a constant head of 3·0 m. Determine the maximum outlet diameter for maximum discharge. Find the maximum discharge also. Take atmospheric pressure head = 10·3 m of water and separation pressure head = 2·5 m of water absolute.   7

5.   (a)   Obtain an expression for head loss in a sudden expansion in the pipe. List all the assumptions made in the derivation.   7

(b) Determine the rate of flow of water through a pipe of diameter 10 cm and length 60 cm where one end of the pipe is connected to a tank and the other end of the pipe is open to the atmosphere. The height of water in the tank from the centre of the pipe is 5 cm. Pipe is given as horizontal and the value of f = 0·01. Calculate minor losses. 7

6. (a) Find an expression for the ratio of the outlet area of the nozzle to the area of the pipe for maximum transmission of power. 7

   (b) The difference in water surface levels in two tanks, which are connected by two pipes in series of lengths 600 m and 400 m and of diameters 30 cm and 20 cm respectively, is 15 m. Determine the rate of flow of water, if the coefficient of friction is 0·005 for both the pipes. Neglect minor losses. 7

7. (a) State the following formulae for the values of C : 6

   (i) Bazin's formula

   (ii) Kutter's formula

   (iii) Manning's formula

(b) Water is flowing through a circular channel at the rate of 400 litres/s, when the channel is having a bed slope of 1 in 9000. The depth of the water in the channel is 0·8 times the diameter. Find the diameter of the circular channel, if the value of Manning's N = 0·015. *8*