00711

No. of Printed Pages : 5

BICE-028

DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

December, 2015

BICE-028 : FLUID MECHANICS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question no. **1** is **compulsory**. **Four** questions are to be attempted out of questions no. 2 to 8. Use of scientific calculator is permitted. Assume missing data, if any.*

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

(a) An ideal fluid is defined as a fluid which

(i) is compressible

(ii) is incompressible

(iii) is incompressible and non-viscous

(iv) has negligible surface tension

(b) Kinematic viscosity is defined as equal to

(i) dynamic viscosity × density

(ii) dynamic viscosity/density

(iii) dynamic viscosity × pressure

(iv) pressure × density

(c) Stoke is the unit of

(i) surface tension

(ii) viscosity

(iii) kinematic viscosity

(iv) None of the above

(d) The gases are considered incompressible when the Mach number is

(i) equal to 1·0

(ii) equal to 0·5

(iii) more than 0·3

(iv) less than 0·2

(e) The necessary condition for the flow to be steady is that

(i) the velocity does not change from place to place

(ii) the velocity is constant at a point with respect to time

(iii) the velocity changes at a point with respect to time

(iv) None of the above

(f) Bernoulli's theorem deals with the law of conservation of

(i) mass

(ii) momentum

(iii) energy

(iv) None of the above

(g) The flow rate through a circular pipe is measured by

(i) Pitot tube

(ii) Venturimeter

(iii) Orificemeter

(iv) Both (ii) and (iii)

2. (a) Compare and contrast uniform and non-uniform flow. *4*

(b) The diameters of a pipe at sections 1 and 2 are 10 cm and 15 cm, respectively. Find the discharge through the pipe, if the velocity of water flowing through the pipe at section 1 is 5 m/sec. Also determine the velocity at section 2. *10*

3. (a) What are the assumptions made in the derivation of Bernoulli's equation ? *4*

(b) Define venturimeter. *2*

(c) 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 the inlet and the throat is 20 cm of mercury. Determine the rate of flow. *8*

4. (a) Briefly describe the classification of orifice. 7

(b) The head of water over the centre of an orifice of diameter 20 mm is 1 m. The actual discharge through the orifice is 0·85 litres/sec. Find the coefficient of discharge. 7

5. (a) Derive an expression for discharge through a fully submerged orifice. 8

(b) Find the discharge through a fully submerged orifice of width 2 m, if the difference of water levels on both sides of the orifice is 50 cm. The height of water from top and bottom of the orifice are 2·5 m and 2·75 m, respectively. (Take coefficient of discharge, $C_d = 0·6$) 6

6. (a) Find the loss of head when a pipe of diameter 20 cm is suddenly enlarged to a diameter of 40 cm. The rate of flow of water through the pipe is 250 litres/sec. 7

(b) A horizontal pipe of diameter 50 cm is suddenly contracted to a diameter of 25 cm. The pressure intensities in the large and small pipes are given as 13·734 N/cm^2 and 11·772 N/cm^2, respectively. Find the loss of head due to compaction, if $C_c = 0·62$. 7

7. (a) Derive an expression for the flow through a circular channel. 7

(b) The rate of flow of water through a circular channel of diameter 0·6 m is 150 liters/sec. Find the slope of the bed of the channel for maximum velocity. (Take Chezy's C = 60). 7

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Chezy's Constant C

(b) Causes of Minor Energy Losses

(c) Viscosity

(d) Newtonian Fluid vs Non-Newtonian Fluid

(e) Bulk Modulus

(f) Coplanar Non-Current Forces