DIPLOMA IN CIVIL ENGINEERING DCLE(G)
DIPLOMA IN MECHANICAL ENGINEERING (DME)

Term-End Examination

00348

December, 2013

BET-037 : FLUID MECHANICS

Time : 2 hours *Maximum Marks : 70*

Note : *All questions are* ***compulsory****. Draw neat sketch wherever necessary. Use of scientific calculator is* ***allowed.***

1. (a) Select the correct alternative : **7x1=7**

(i) The gauge pressure at a point is equal to _____

(A) Absolute pressure

(B) Local atmospheric pressure

(C) Absolute pressure – local atmospheric pressure

(D) None of the above

(ii) If the flow characteristics at a point change with respect to time then flow is :

(A) Steady flow

(B) Unsteady flow

(C) Uniform flow

(D) Non-uniform flow

(iii) Let C_d = coefficient of discharge for a submerged orifice and c_d^1 = coefficient of discharge for similar orifice discharging free then :

(A) $C_d < C_d'$

(B) $C_d > C_d'$

(C) $C_d = C_d'$

(D) none of the above

(iv) Borda's carnot equation for loss of head due to sudden enlargement is :

(A) $h_L = \frac{(V_1 - V_2)^2}{2g}$

(B) $\frac{V_1^2 - V_2^2}{2g}$

(C) $\frac{\sqrt{V_1^2 - V_2^2}}{2g}$

(D) $\frac{V_1^2 - V_2^2}{\sqrt{2g}}$

(v) The vertical intercept between Hydraulic gradient line and Energy gradient line in a pipe flow is :

(A) $V/\sqrt{2g}$

(B) $V^2/2g$

(C) hf/L

(D) None of the above

(vi) Manning's formula for channel flow is :

(A) $V = N\sqrt{RS}$

(B) $V = NR^{2/3} S^{1/2}$

(C) $V = \frac{1}{N} R^{2/3} S^{1/2}$

(D) $V = \frac{1}{N} R^{1/2} S^{2/3}$

(vii) For flow in a circular pipe of diameter 'D', the relationship between Chezy's "C" and Darcy's "f" is :

(A) $c = \sqrt{fg}$

(B) $c = \sqrt{\frac{8g}{f}}$

(C) $f = \sqrt{\frac{8g}{C}}$

(D) $c = \sqrt{2gf}$

(b) Fill in the blanks or tick the correct response :

(i) Unit of "coefficient of viscosity" is _____. ($N.S.m^{-1}/N.S.m^{-2}$) **7x1=7**

(ii) Unit of "Bulk modulus of elasticity" is _____. ($kN.m^{-2}/kN.m^{-3}$)

(iii) Surface tension is caused by cohesive _____. (forces/adhesive forces)

(iv) Momentum of a body, having mass "m" and velocity "v" , is given by _____. ($0.5\ mv^2/mv$)

(v) 10 joule = _____ N.m.

(vi) $Q = Q_1 + Q_2 + Q3$ is valid for pipes connected in _____. (series/ parallel)

(vii) If the mass density of a given gas is 2 kg/m^3,its specific volume will be _____.

2. Answer *any two* of the following : **2x7=14**

(a) Derive the Bernoulli's Equation, stating the assumptions made in.

(b) Oil of specific gravity 0.8 flows through a 20 cm diameter pipe under a pressure of 98.1 kN/m^2. If the datum is 4m below the centre of the pipe and total energy with respect to datum is 30 N.m/N, calculate the discharge through pipe.

(c) The velocity of a body of mass 100 kg changes from 2m/s to 4m/s, in the same direction in a time of 25 seconds. Determine the applied force and the impulse.

3. Answer *any two* of the following : **2x7=14**

(a) A sharp edged orifice of 4 cm diameter discharges water under a head of 6m. Find the values of coefficients of velocity, contraction and discharge if the measured rate of flow is 0.0085 cumecs. The diameter of the jet at the vena contracta is 3.2 cm.

(b) Describe the "Trajectory method" for determining the coefficient of velocity, for a vertical orifice, experimentally. Also give the neat sketch, marking the various terms used in formula.

(c) A 180 mm diameter pipe reduces abruptly in diameter to 120 mm. If the pipe carries water at 0.04 m^3/s. Calculate the loss of head across the contraction. Take coefficient of contraction as 0.56.

4. Answer *any two* of the following : **2x7=14**

(a) A rectangular channel has a bed width of 3.0 m and a slope of 1 in 500. Find the depth of flow if the discharge is 12 cumecs. Use chezy's formula, C = 50.

(b) Describe the Reynold's experiment on flow through pipe. Also define the Reynold's number and its significance.

(c) Water is discharged from a large reservoir to atmosphere through a 20 cm diameter and 600 m long pipe. Find the discharge if the outlet is 20m below the free surface of water in reservoir. Assume the entry to the pipe as sharp. Take f = 0.04.

5. Describe briefly (*any four* of the following) : **4x3$^1/_2$=14**

(a) Bulk modulus and specific volume

(b) Newtonian fluids and Non-Newtonian fluids

(c) List of minor losses in pipe

(d) Ideal fluid and Real fluid

(e) Laminar flow and turbulent flow

(f) Orifice meter and venturimeter.