BET-037

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

Term-End Examination 00594

June, 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) Capillary action is due to
        (A) cohesion only
        (B) adhesion only
        (C) both cohesion and adhesion
        (D) none of the above
    (ii) For velocity distribution of laminar flow through pipe, which one is correct ?
        (A) maximum velocity = 1.5 × mean velocity
        (B) maximum velocity =2* mean velocity
        (C) maximum velocity < mean velocity
        (D) maximum velocity = mean velocity.

(iii) The discharge coefficient (C_d) of a sharp edged circular orifice generally various between :

(A) .59 to .68   (B) .95 to .99

(C) .30 to .40   (D) .80 to .90

(iv) Borda's mouth piece is :

(A) internal mouth piece running full

(B) internal mouth piece running free

(C) external cylindrical mouth piece

(D) external convergent mouth piece.

(v) For a circular pipe of diameter, D, running full, the hydraulic radius (R) is given by :

(A) $D/2$ (B) $D/4$

(C) πD^2 (D) πD

(vi) When pipes are laid in parallel :

(A) The discharge through each pipe is the same

(B) The head loss is same for each pipe

(C) The discharge through each pepe is inversely proportional to the diameter.

(D) none of the above

(vii) The syphon-pipe lies :

    (A)   above H.G.L

    (B)   below H.G.L.

    (C)   along H.G.L.

    (D)   any where

(b)   Tick the correct response :   7x1=7

   (i)   The property of fluid which determines its resistance to shearing stress is called _____.

       (modules of elasticity/viscosity/buoyancy)

   (ii)   Atmospheric pressure is measured by _____.

       (barometer/hydrometer/seismoscope)

   (iii) The ratio between C_v and C_d for a bell-mouthed orifice is_____.

       (greater than one / less than one / equal to one).

   (iv) The negative pressure at venacontract a in external mouth piece _____ (decrease / increase) the discharge.

   (v)   To avoid cavitation, the absolute pressure in a syphon pipe should be _____ (greater / lesser) than the vapour pressure.

   (vi) The unit of power is _____.

       (Joule / watt / volt)

   (vii) The coefficient of an orifice-meter as compared to that of venturimeter is _____.

       (lower / higher / equal)

2. Answer **any two** of the following :

   (a) (i) Derive the expression for capillary rise   **4** for water in a clean glass tube of small diameter 'd'.

       (ii) Find the surface tension in a soap   **3** bubble of 40mm diameter when the inside pressure is $2.5 \ N/m^2$ above atmospheric pressure.

   (b) With the help of neat line-sketch, describe   **7** absolute, gauge, atmospheric and vacuum pressure.

   (c) A cubical tank has sides of 1.5 m each. It   **7** contains water (mass density $1000kg/m^3$) for the lower 0.6m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate total pressure at the bottom of one vertical side of the tank. Draw the sketch showing pressure variation along depth.

3. Answer **any two** of the following :

   (a) (i) Describe the assumptions made in the   **3** derivation of Bernoulli's equation.

       (ii) The head of water over the centre of   **4** an orifice of diameter 20mm, is 1m. The actual discharge through the orifice is 0.85 lit/s. Find coefficient of discharge of the orifice.

(b) The rate of flow of water through a horizontal pipe is $0.25 m^3/s$. The diameter of pipe which is 200 mm is suddenly enlarged to 400 mm. Find the loss of head.   7

(c) Determine the power required by a pump, having 70% efficiency, for pumping $0.1 m^3/s$ of water from sump through 25 cm diameter pipe of 5 km length. Take static lift from the sump to supply point as 16m and $f = 0.02$.   7

4. Answer **any two** of the following :

(a) Water flows through a circular channel of diameter 1.00 m at the rate of $0.3 m^3/s$. If the slope of channel is $\dfrac{1}{500}$ and the depth of flow is 500 mm, calculate the Chezy's coefficient and velocity of flow.   7

(b) Explain the relative merits and demerits of orifice meter and venturimeter.   7

(c) Calculate the discharge through a trapezoidel channel, having bottom width of 3m and side slopes 1 vertical to 1.5 horizontal. The slope of bed is $\dfrac{1}{1500}$ and depth of water is 1.2 m. Use manning formula and take N = 0.025.   7

5. (a) Differentiate between the terms of *any one* of the following : **1x4=4**

   (i) Steady flow and Un-steady flow

   (ii) Ideal fluid and Real Fluid

   (b) Write short note on **any two** of the following : **2x5=10**

   (i) Pipes in parallel

   (ii) Inclined venturimeter

   (iii) Darcy-Weisbach equation