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BET-037

DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) / DIPLOMA IN ELECTRICAL AND MECHANICAL ENGINEERING (DEME)

Term-End Examination

00871

June, 2015

BET-037 : FLUID MECHANICS

Time : 2 hours *Maximum Marks : 70*

Note : *Answer **all** questions. All questions carry equal marks. Use of Scientific Calculator is permitted.*

1. Choose the correct answer from the given alternatives. *14×1=14*

(a) An ideal fluid has viscosity of value

(i) 0·5 poise

(ii) 1·0 poise

(iii) zero value

(iv) 0·25 poise

(b) Mass density (ρ) of water in kg/m^3 is

(i) 680

(ii) 900

(iii) 998

(iv) 1268

(c) Dimensions of Surface Tension are

(i) $M^1 L^1 T^{-2}$

(ii) $M^1 L^0 T^{-2}$

(iii) $M^1 L^2 T^{-2}$

(iv) $M^1 L^0 T^{-1}$

(d) Slope of energy gradient line is given by

(i) $S = \frac{Q}{L}$

(ii) $S = \frac{hf}{L}$

(iii) $S = \frac{L}{hf}$

(iv) $S = \frac{hf}{A}$

(e) Physical quantities used in Fluid-mechanics are expressed in the following fundamental dimensions :

(i) Length, Mass and Time

(ii) Force, Mass and Temperature

(iii) Mass, Time, Temperature and Force

(iv) Length, Mass, Time, Force and Temperature

(f) In Coplanar Non-Concurrent Forces

(i) All forces lie in one plane

(ii) All forces pass through a common point

(iii) All forces do not pass through a common point

(iv) (i) and (iii) above

(g) Practical fluids

(i) are viscous

(ii) possess surface tension

(iii) are compressible

(iv) Possess all the above

(h) Highest efficiency is obtained with the following channel section :

(i) Circular

(ii) Rectangular

(iii) Trapezoidal

(iv) Triangular

(i) For pipes, turbulent flow occurs when Reynolds number is

(i) Less than 2000

(ii) Less than 4000

(iii) More than 4000

(iv) Between 2000 and 4000

(j) The discharge through a rectangular notch weir varies as

(i) $H^{-1/2}$

(ii) $H^{3/2}$

(iii) $H^{1/2}$

(iv) $H^{5/2}$

(k) If pressure intensity is expressed with respect to complete vacuum, it is called as

(i) Gauge pressure

(ii) Vacuum pressure

(iii) Absolute pressure

(iv) Atmospheric pressure

(l) The velocity at which the flow changes from laminar to turbulent is called

(i) Critical velocity

(ii) Lower critical velocity

(iii) Upper critical velocity

(iv) Mean critical velocity

(m) The loss of head at bends is expressed as

(i) $H_L = \frac{V^2}{2g}$

(ii) $H_L = \frac{kV^2}{2g}$

(iii) $H_L = \frac{gV^2}{2k}$

(iv) $H_L = \frac{2gk}{V^2}$

(n) The coefficient of contraction (C_c) of the convergent mouthpiece

(i) increases as the angle of convergence (θ) increases.

(ii) decreases as the angle of convergence (θ) increases.

(iii) decreases as the angle of convergence (θ) decreases.

(iv) never changes.

2. Answer any ***two*** of the following questions : *2×7=14*

(a) Write about orifice meter and venturimeter with their merits and demerits.

(b) An orifice meter is fixed in a pipe of 25 cm diameter conveying oil of specific gravity 0·90. If the diameter of the orifice is 10 cm, calculate the discharge, when a mercury differential manometer shows a difference of 80 cm. (Take C = 0·65)

(c) Water flows through a 200 mm diameter pipe fitted with a 100 mm diameter horizontal orifice meter at the rate of 0·015 m^3/s. Determine the difference of pressure head between upstream and vena contracta. (Take C = 0·61)

3. Answer any ***two*** of the following questions : *2×7=14*

(a) Derive an equation for the loss of head due to obstruction.

(b) A box of rectangular base 3 m × 4 m contains gasoline (specific gravity = 0·8) upto a height of 5 m. Calculate the force on the base and on each of the vertical faces and locate their lines of action.

(c) Explain about the types of flow with examples.

4. Answer any ***two*** of the following questions : *2×7=14*

(a) Explain about classification of forces.

(b) For the distribution main of a town water supply, a 600 mm diameter pipe is required. As pipes of 600 mm diameter are not available, it is decided to lay two smaller pipes of equal diameter in parallel. Find the diameter of these pipes.

(c) A reservoir having a surface area of 800 m^2 is emptied by a 0·5 m wide rectangular weir. How long should it take to empty the reservoir from a height 0·3 m to 0·2 m above the sill (Take C_d = 0·65).

5. Answer any ***two*** of the following questions : *2×7=14*

(a) Write short notes on any ***two*** of the following :

(i) Hydraulic Mean Depth

(ii) Energy Gradient Line

(iii) Hydraulic Gradient Line

(b) Explain about Reynolds experiment on flow through pipes.

(c) Two reservoirs are connected by 2 pipes of the same length laid in parallel. The diameters of the pipes are 10 cm and 30 cm respectively. If the discharge through 10 cm dia pipe is 0·01 cumecs, what will be the discharge through 30 cm dia pipe ? Assume that f is same for both pipes.