

**DIPLOMA – VIEP – CIVIL ENGINEERING  
(DCLEVI)**

**Term-End Examination**

00042

**December, 2017**

**BICE-028 : FLUID MECHANICS**

*Time : 2 hours*

*Maximum Marks : 70*

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

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1. Write the most appropriate answer for the following :

$7 \times 2 = 14$

- (a) Major losses occur due to
- (i) Friction
  - (ii) Bend
  - (iii) Pipe fitting
  - (iv) Enlargement

- (b) Reynolds number is the ratio of
- (i) Mass and volume
  - (ii) Length and time
  - (iii) Inertial forces to viscous forces
  - (iv) Viscous force to gravity
- (c) Conservation of energy leads to
- (i) Continuity equation
  - (ii) Bernoulli's equation
  - (iii) Mass
  - (iv) Velocity
- (d) Manometer is used to measure
- (i) Pressure
  - (ii) Velocity
  - (iii) Mass
  - (iv) Discharge
- (e) The units of surface tension are
- (i) N
  - (ii) m
  - (iii) N/m
  - (iv)  $N/m^2$
- (f) Capillarity is caused by
- (i) Adhesion
  - (ii) Cohesion
  - (iii) Both (i) and (ii)
  - (iv) None of the above

- (g) A weir is used to measure
- (i) Rate of flow
  - (ii) Density
  - (iii) Specific gravity
  - (iv) None of the above
2. (a) Describe the general energy equation for flow of fluids. 5
- (b) Derive Bernoulli's equation from Euler's equation. 9
3. (a) A horizontal venturimeter with inlet diameter 200 mm and throat diameter 100 mm is used to measure the flow of water. The pressure at the inlet is  $0.18 \text{ N/mm}^2$  and the vacuum pressure at the throat is 280 mm mercury. Find the rate of flow. The value of  $C_d$  may be taken as 0.98. 7
- (b) Describe the experimental procedure for determination of coefficients of contraction, velocity and discharge. 7
4. (a) A circular tank of diameter 3 m contains water up to a height of 4 m. The tank is provided with an orifice of diameter 0.4 m at the bottom. Find the time taken by water (i) to fall from 4 m to 2 m, and (ii) for completely emptying the tank. Assume  $C_d = 0.6$ . 4+4

- (b) Discuss the classification of mouthpieces according to position of the mouthpiece, shape of the mouthpiece and nature of discharge. 6
5. (a) In a pipe of 300 mm diameter and 800 m length, an oil of specific gravity 0.8 is flowing at a rate of  $0.45 \text{ m}^3/\text{s}$ . Find (i) head lost due to friction, and (ii) power required to maintain the flow. Assume kinematic viscosity of oil as 0.3 stokes. 5+3
- (b) Derive the equation for head loss due to sudden enlargement. 6
6. (a) Describe the different types of flow in channels. 8
- (b) A compound piping system consists of 1800 m of 50 cm diameter, 1200 m of 40 cm diameter and 600 m of 30 cm diameter pipe of the same material connected in series. What is the equivalent length of a 40 cm diameter pipe of the same material? Assume that  $f$  is constant and same for all the pipes and ignore any head loss due to contractions. 6

7. Write short notes on any *four* of the following :

$$4 \times 3 \frac{1}{2} = 14$$

- (a) Pitot Tube
  - (b) Inclined Venturimeter
  - (c) Circular Formula
  - (d) Orifice Meter
  - (e) Darcy-Weisbach Equation
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