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CE 131305 NR

Roll No. of candidate

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2023

BINA CHOWDHURY CENTRAL LIBRARY  
(CMT&GIPS)  
Azara, Halkhowapara,  
Guwahati - 781017

B.Tech. 3<sup>rd</sup> Semester End-Term Examination

CE

BASIC FLUID MECHANICS

(New Regulation)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Choose the correct answer : (10 × 1 = 10)
- (i) The weight per unit volume of a liquid at a standard temperature and pressure is called
    - (a) Specific weight
    - (b) Specific gravity
    - (c) Mass density
    - (d) None of these
  - (ii) The force per unit length is the unit of
    - (a) Surface tension
    - (b) Consistency test
    - (c) Compressibility
    - (d) Compressive Strength Test
  - (iii) A manometer is used to measure
    - (a) Low pressure
    - (b) High pressure
    - (c) Moderate pressure
    - (d) Atmospheric pressure
  - (iv) The buoyancy depends upon the
    - (a) Weight of the liquid displaced
    - (b) Viscosity of the liquid
    - (c) Pressure with which the liquid is displaced
    - (d) Compressibility of the liquid

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- (v) An average value of coefficient of velocity is  
(a) 0.62 (b) 0.84  
(c) 0.76 (d) 0.97
- (vi) An opening in the side of a tank or vessel such that the liquid surface with the tank is below the top edge of the opening is called  
(a) Weir (b) Orifice  
(c) Notch (d) None of these
- (vii) The flow in a pipe is turbulent when Reynold number is  
(a) Less than 2000 (b) More than 2800  
(c) Between 2000 and 2800 (d) None of these
- (viii) The value of bulk modulus of a fluid is required to determine  
(a) Reynold's number (b) Mach number  
(c) Froude's number (d) Euler's number
- (ix) Reynold's number is the ratio of inertia force to  
(a) Pressure force (b) Gravity force  
(c) Elastic force (d) Viscous force
- (x) The unit of kinematic viscosity in S.I. units is  
(a) N-m/s (b)  $M^2/s$   
(c) N-s/m<sup>2</sup> (d) N-m
2. (a) One litre of crude oil weighs 9.6N. Calculate its specific weight, density and specific gravity. (6)  
(b) State and prove the Pascal's law. (5)  
(c) Define Continuity equation and Bernoulli's equation. (4)
3. (a) What are the conditions of equilibrium of a floating body and a submerged body? (5)  
(b) Determine the total pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that centre of plate is 2m below the free surface of water. Find the position of centre of pressure also. (10)

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4. (a) The diameters of a pipe at the sections 1 and 2 are 20 cm and 25 cm respectively. Find the discharge through the pipe if velocity of water at section 1 is 6 m/s. determine also the velocity at section 2. (7)
- (b) A rectangular orifice, 1.0m wide and 1.5m deep is discharging water from a vessel. The top edge of the orifice is 0.8m below the water surface in the vessel. Calculate the discharge through the orifice if  $C_d = 0.6$ . (8)
5. (a) Find the discharge through a trapezoidal notch which is 1.2m wide at the top and 0.50 m at the bottom and is 40 cm in height. The head of water on the notch is 30 cm. Assume  $C_d$  for rectangular portion as 0.62 while for triangular portion = 0.60. (7)
- (b) 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 inlet and throat is 10 cm of mercury. Determine the rate of flow. Take  $C_d = 0.98$ . (8)
6. (a) A wooden block of width 3 m, depth 2.5 m and length 6 m floats horizontally in water. Find the volume of water displaced and position of centre of buoyancy. The specific gravity of the wooden block is 0.7. (7)
- (b) Define Hydrostatic Law. An oil of specific gravity 0.8 is contained in a vessel. At a point the height of oil is 20m. find the corresponding height of water at that point. (8)
7. (a) How will you determine the loss of head due to friction in pipes by using-
- (i) Darcy formula
- (ii) Chezy's formula (10)
- (b) Give the dimensions of :
- (i) Force
- (ii) Viscosity
- (iii) Power
- (iv) Velocity
- (v) Discharge. (5)

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