No. of Printed Pages : 4

BEY–003

B. SC. (APPLIED SCIENCE–ENERGY) (BSCAEY)

Term-End Examination

December, 2025

BEY-003 : FLUID MECHANICS

Time : 3 Hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume missing data suitably, if any.*

1. (a) With the help of examples, explain viscosity in fluids. 5

   (b) Determine the bulk modulus of elasticity of liquid which is compressed in a cylinder from a volume of 0.0135 m^3 at 80 N/cm^2 to a volume of 0.0134 m^3 at 150 N/cm^2. 5

2. (a) Define Buoyant Force. What fraction of an iceberg would be above the free surface in the ocean, if the density of ice is 92 kg/m^3 and density of sea water is 1030 kg/m^3 ? 5

   (b) With help of neat sketches, discuss the stability of floating bodies. 5

3. Two velocity components are given below. Find the third component such that they satisfy the continuity equation : 5+5

   (a) $u = x^3 + y^2 + 2z^2$; $v = -x^2y - yz - xy$

   (b) $u = \log (y^2 + z^2)$; $v = \log (x^2 + z^2)$

4. A 0.3 m pipe carries water at a velocity of 24.4 m/sec. At points A and B, measurements of pressure were 361 kN/m^2 and 288 kN/m^2, elevations at A and B were 30.5 m and 33.5 m respectively. For steady flow, find the loss of head between A and B. 10

5. With the help of suitable examples, differentiate between the following : 2.5×4=10

   (a) Orifice and Nozzle

   (b) Newtonian fluid and Non-Newtonian fluid

   (c) Compressible fluid and Incompressible fluid

   (d) Static pressure and Dynamic pressure

6. (a) Discuss the causes of resistance experienced by a ship moving through water. 5

   (b) With the help of neat sketches, explain *three* types of similarity. 5

7. Describe water hammer in pipes. Discuss pressure head due to water hammer for the following cases : 10

   (a) Gradual closure of valve

   (b) Instantaneous closure of valve

8. With the help of neat diagrams, discuss lift on aerofoil. 10

9. Discuss head loss in pipe fittings (a) in gradual transition and (b) due to sudden contraction. 5+5

10. Write short notes on any *four* of following : 2.5×4=10

    (a) Newton's law of viscosity

    (b) Eddy viscosity

    (c) Dimensional homogeneity

    (d) Flow net

    (e) Path line and streak line

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