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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

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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

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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

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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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