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BEY–003

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

Term-End Examination

June, 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. Explain the following in brief : 5×2=10

   (a) Surface Tension and Capillarity

   (b) Vapour Pressure

   (c) Bulk Modulus of Elasticity

   (d) Viscosity

   (e) Density

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2. Discuss the applications of Bernoulli's equation in the context of the following : 5+5

   (a) Pitot tube

   (b) Venturimeter

3. Differentiate between the following : 4×2.5=10

   (a) Laminar and Turbulent flow

   (b) Steady and Unsteady flow

   (c) Uniform and Non-uniform flow

   (d) Isothermal and Isentropic flow

4. Explain the continuity equation in fluid mechanics. Derive it for incompressible flow. Discuss the significance of the continuity equation. 10

5. (a) Explain how the coefficient of velocity of a jet issuing through an orifice can be determined experimentally. 5

   (b) Derive an expression for head loss in an orifice flow in terms of coefficient of velocity and jet velocity. 5

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6. (a) Discuss the physical significance of Reynolds' number and Froude's number. 5

   (b) Why are river models distorted ? Discuss the various types of distortions that are given to these models. 5

7. (a) A model of a ship 1.0 m long with negligible frictional resistance is tested in a towing tank at a velocity of 0.80 m/sec. To what ship velocity does this correspond to if the ship is 60 m long ? If a force of 7.0 N is required to tow this model, find the force required in the prototype. 5

   (b) With the help of neat sketches, explain lift on Aerofoil. 5

8. Discuss the various losses in a pipeline. 10

9. (a) Explain 'No ship condition'. $2\frac{1}{2}$

   (b) Define 'free stream velocity'. $2\frac{1}{2}$

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(c) List the characteristics of turbulent flow. $2\frac{1}{2}$

(d) Explain 'Newton's law of viscosity in brief. $2\frac{1}{2}$

10. Write short notes on any *four* of the following : $4\times2.5=10$

(a) Magnus effect

(b) Water hammer

(c) Surge tank

(d) 'Equivalent sand grain' roughness

(e) Orifice meter

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