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Total No. of Questions : 10]

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**B.E. IVth Semester (CGPA)
Examination, 2017**

EFS-328

CIVIL ENGG.

(Fluid Mechanics-I)

Paper : CE-403

Time : 3 Hours]

[Maximum Marks : 60

Note :- Attempt all questions. Each question carries equal marks.

1. (a) Distinguish between Newtonian and Non Newtonian fluids. Give two examples of each. Also explain the Newton's law of viscosity.
- (b) Calculate the power absorbed by fluid friction in a thrust bearing consisting of flat disc 10 cm diameter, placed at the lower end of a vertical shaft. The oil film is 0.25 mm thick and the viscosity of oil is 1.3 poise. The shaft rotates at 2000 rpm.

4,8

SAA-328

(1)

Turn Over

Or

UITians

2. Explain the following :

- (i) Absolute and Gauge pressure
- (ii) Metacentric height
- (iii) Meta centre
- (iv) Stability of floating and submerged body
- (v) Centre of pressure
- (vi) Surface tension

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3. Derive the equation of continuity in differential form and define stream function and potential functions.

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Or

4. Two velocity components are given in the following cases. Find the third component such that they satisfy the continuity equation :

(i) $u = x^2 + y^2 + 2z^2$
 $v = -x^2y - yz - xy$

(ii) $u = \frac{-2xyz}{(x^2 + y^2)^2}, w = \frac{y}{(x^2 + y^2)}$

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5. Derive an expression for energy equation with suitable assumption.

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Or

6. (a) A horizontal venturimeter of $30 \text{ cm} \times 15 \text{ cm}$ is used gauge the flow of water. The differential gauge connector to the inlet and throat shows a reading of 20 cm of mercury. Find the rate of flow. Take $cd = 0.97$.

(b) What is orifice and how is it cheaper than venturimeter ?

8,4

7. (a) What are the various methods of dimensional analysis ? Explain any *one* of them.

(b) Explain the different types of dimensionless numbers and state their significance.

5,7

Or

8. A $\frac{1}{30}$ model of a ship 900 m^2 wetted area travelling in water at 3 m/sec . Experiences a resistance of 20 N . Calculate :

(i) Corresponding speed of the ship.

(ii) The skin friction drag, if the skin drag coefficient for model is 0.004 and the prototype is 0.015 .

(iii) The total drag on the ship.

(iv) The power to propel the ship.

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9. (a) Obtain an expression for laminar flow between two fixed parallel flow.
- (b) Write about Reynold's experiment and its significance.

7,5

Or

10. An oil having viscosity 0.143 Pa^{-5} and the specific gravity of 0.90 flows through a pipe 2.5 cm diameter and 3.0 m long at $\frac{1}{10^{\text{th}}}$ of the critical velocity for which Re. No. is 2500. Find the velocity of flow through pipe, the head in meters of oil across the pipe length required to maintain the flow and power required to overcome viscous resistance to the flow of oil.

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