Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

CE-3002 (CBGS)

B.E., III Semester

Examination, May 2018

Choice Based Grading System (CBGS)

Fluid Mechanics

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.
iii) Assume data, if any missing/required.

1. a) What is capillarity? Derive expression for height of capillary rise.
   b) A 400 mm diameter shaft is rotating at 200 RPM in a bearing of length 120 mm. If the thickness of oil film is 1.5 mm and the dynamic viscosity of the oil is 0.70 NS/m^2. Determine:
      i) Torque required to overcome frictional losses
      ii) Power utilized in overcoming viscous resistance.

2. a) Explain briefly the different types of equilibrium of floating body.
   b) A masonry dam trapezoidal in cross section is 4m wide at the top, 8 m wide at the base and 10 m high. It retains water level with top against a vertical face obtain stress distribution at the base if specific gravity of masonry is 2.5.

3. a) What do you understand by vorticity? Define and explain velocity potential and stream function.
   b) If the velocity field is given by u = (16y–8x), v = (8y–7x) find the circulation around the closed curve defined by $x = 3$, $y = 2$, $x = 7$, $y = 7$.

4. a) State and prove Bernoulli's equation. Also list the assumptions made while deriving Bernoulli's equation.
   b) 250 litres/sec of water is flowing in a pipe having a diameter of 300 mm if the pipe is bend by 120°. Find the magnitude and direction of the resultant force on the bend. The pressure of water flowing is 400 kN/m^2. Take specific weight of water is 9.81 kN/m^3.

5. a) What is meant by a smooth boundary and a rough boundary?
   b) Derive an expression for calculating loss of head due to sudden contraction and due to sudden enlargement.

6. a) Derive an expression for the power transmission through pipes. Find also the condition for maximum transmission of power and corresponding efficiency.
   b) Obtain an expression for rise in pressure in a thin plastic pipe of circular section in which the flow of water is stopped by sudden closure of a valve.

7. a) What is Chezy's formula? How is it derived?
   b) Derive an expression for loss of energy head for a hydraulic jump.

8. a) Differentiate between "Gradually varied flow" and "Rapidly varied flow".
   b) Derive an expression for dynamic equation for gradually varied flow. Also state the assumptions made.

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