Code No.: ME404PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) - February- 2023
FLUID MECHANICS AND HYDRAULIC MACHINES
(MECH)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurements. [2M]
   b) Define pressure. State Pascal's law. Calculate atmospheric pressure at 760 mm of mercury. [2M]
   c) Define the equation of continuity. [2M]
   d) What are the applications of Bernoulli's equation? [2M]
   e) Explain briefly the term boundary layer. [2M]
   f) Define the terms: Major energy loses and minor energy loses in pipes. [2M]
   g) Define the term Impact of jet. [2M]
   h) Define hydraulic efficiency. [2M]
   i) What is negative slip in a reciprocating pump? What are the causes for it? [2M]
   j) List the main parts of the Centrifugal pumps. [2M]

PART-B **(50 Marks)**

2. Explain the Newton's Law of viscosity with neat sketch. How does the viscosity vary with temperature in liquids and gases? [10M]

OR

3. Differentiate simple manometers with differential manometer with respect to principle and applications. [10M]

4. Define the following and give one practical example for each: (i) Laminar flow (ii) Turbulent flow (iii) Steady flow and (iv) Uniform flow. [10M]

OR

5. Water is flowing through a pipe having diameter 300 mm at upper end and 200 mm at the bottom end. The pressure at the bottom end is 24.525 N/cm^2 and at the upper end is 9.81 N/Cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. [10M]

6. A pipe line 50 cm diameter takes off from a reservoir whose water surface elevation is 145 m above datum. The pipe is 4500 m long and is laid completely at the datum level. In the last 100 m of the pipe, water is withdrawn by the series of pipes at a uniform rate of 0.075 m^3/s per 250 m. Determine the pressure at the end of the pipe line. Assume f (friction factor) =0.018 and the pipe to have a dead end. [10M]

OR

7. Derive Darcy-Weisbach formula for calculating loss of head due to friction in a pipe. [10M]

8. A jet of water of diameter 7.5 cm strikes a curved plate at its center with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction jet. The jet is deflected through an angle of 165^0. Assuming the plate is smooth, find the Force exerted on the plate in the direction of jet, Power of the jet and Efficiency of the jet? [10M]

OR

9. A Pelton wheel has a mean bucket speed of 10m/s with a jet of water flowing at the rate of 700lts/sec under a head of 30 m. the buckets deflect the jet through an angle of 1600 Determine the power given by the water to the runner and hydraulic efficiency of the turbine? Assume co-efficient of velocity=0.98. [10M]

10.a) State the main classification of reciprocating pump. [5M]

b) Explain the difference between turbines and pumps. [5M]

OR

11. Explain the difference between centrifugal pumps and reciprocating pumps. [10M]

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