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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II-B.TECH-II-Semester End Examinations (Supply) - February- 2024
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) Define Density and Specific Gravity of fluid. [2M]
- b) Differentiate between Absolute and Gauge Pressure. [2M]
- c) Define Steady and Unsteady flow. [2M]
- d) Write the Bernoulli's equation applied between two sections with losses. [2M]
- e) What are the minor losses in a pipe? [2M]
- f) Define Boundary layer Thickness of thin plate. [2M]
- g) Write the expression for Force exerted by a jet on a moving inclined Flat plate. [2M]
- h) Define draft tube and classify the draft tubes. [2M]
- i) Write the Efficiencies of a Centrifugal Pump. [2M]
- j) Define slip, percentage of slip of a reciprocating pump. [2M]

PART-B

(50 Marks)

2. The dynamic viscosity of an oil, used for lubrication between a shaft a sleeve is 6 poise. [10M]
The shaft is of diameter 0.4 m and rotates at 190 rpm. Calculate the power lost in bearing for sleeve length of 90 mm. The thickness of oil film is 1.5 mm.
- OR**
3. The right limb of a simple U –tube manometer containing mercury is open to the atmosphere while the left limb is connected to pipe in which a fluid of Sp. gravity 0.9 is flowing. The center of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. [10M]
 4. State the momentum equation and derive the expression for force exerted by a flowing fluid on a pipe bend. [10M]
- OR**
5. Define and classify various types of fluid flows with examples. [10M]
 6. A Horizontal venturimeter with inlet diameter 20 cm throat diameter 10 cm is used to measure the flow of oil specific gravity 0.8. The discharge of oil through venturimeter is 60 litres/s. Find the reading of the oil-mercury differential manometer. Take $C_d=0.98$. [10M]
- OR**
7. Derive an expression for loss of head due to friction in pipes. [10M]
 8. Derive an expression for a force exerted by a jet of water on a series of vanes with neat sketch and state the expression for condition for maximum efficiency. [10M]
- OR**
9. A Kaplan turbine develops 24647.6 kW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine. [10M]

10. The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. [10M]

OR

11. What is a reciprocating pump? Describe the principle and working of a reciprocating pump with neat sketch. [10M]
