

R16

Code No: 134BC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, December - 2019

FLUID MECHANICS AND HYDRAULIC MACHINES

(Common to ME, MSNT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 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 as sub-questions.

PART - A

(25 Marks)

- 1.a) Define viscosity, how viscosity varies with temperature. [2]
- b) Explain the surface tension and derive an expression for cylindrical jet. [3]
- c) Compare streamline, streak line and path line. [2]
- d) Explain body and surface forces. [3]
- e) Outline the methods to prevent boundary layer separation. [2]
- f) Define drag and lift forces. [3]
- g) Define specific speed of a turbine. [2]
- h) What is the importance of draft tube in case of pressure turbines? [3]
- i) What is Net positive suction head? [2]
- j) Outline the indicator diagram for reciprocating pump. [3]

PART - B

(50 Marks)

2. A U tube differential manometer connects two pressure pipes A and B, A contains carbon tetra chloride having a specific gravity 1.594 under a pressure of 11.772 N/Sq cm and pipe B contains oil of specific gravity 0.8 under a pressure of 11.772 N/Sq. cm. The pipe A lies 2.5 m above pipe B. Find the difference of pressure measured by mercury as fluid filling U tube. [10]

3. What is manometer and classify them? **OR** [10]

4. Develop an expression for Bernoulli's equation with necessary assumptions. [10]

OR

5. A 45° reducing bend is connected in a pipeline, diameters at the inlet and outlet of the bend being 600mm and 300mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/Sqcm and rate of flow of water is 600 Lt/Sec. [10]

6. Explain with a neat sketch, explain the boundary layer formation. [10]

OR

7. Develop an equation for major losses in pipes. [10]

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8. Classify the turbines and with neat sketch, explain the working of inward radial flow radial reaction turbine. [10]

OR

9. Determine the power given by the jet of water to the runner of Pelton wheel which is having tangential velocity as 20m/s. The net head on the turbine is 50m and discharge through the jet water is $0.03 \text{ m}^3/\text{Sec}$. The side clearance angle is 15° and take $C_v = 0.975$. [10]

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10.a) Classify the types of draft tubes used in reaction turbine with neat sketch. [5+5]
b) Analyze the characteristic curves of centrifugal pump.

OR

11.a) A centrifugal pump having an outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/Sec. The fins are set back at an angle of 40° at the outlet. If the outer diameter of the impeller is 500 mm and width at the outlet is 50mm, determine: i) vane angle at inlet ii) work done by impeller on water per second and iii) manometric efficiency.

b) Explain the function of air vessel in a reciprocating pump with neat sketch. [5+5]

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