

Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

EVENING

[Total No. of Questions: 09]

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Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 4th

Name of Subject: Fluid Mechanics and Machinery

Subject Code: PCME-108

Paper ID: 16198

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) What do you understand by mass flow rate?
- b) Write down the Bernoulli's Equation with assumptions.
- c) What is NPSH?
- d) Why does Kaplan Turbine have less number of blades?
- e) Make a proportionate sketch of fluid coupling.
- f) If the speed of a reciprocating pump is increased, what will be the unfavourable effect?

Part – B

[Marks: 04 each]

- Q2.** How are fluid machines classified. Explain briefly the different types of hydrodynamic machines.
- Q3.** State Impulse Momentum Equation. Also give its applications.
- Q4.** Drive an expression for minimum speed for starting a centrifugal pump.
- Q5.** Calculate the discharge through a pipe of diameter 200 mm when the difference of pressure head between the two ends of a pipe 500 m apart is 4 m of water. Take the value of "f" = 0.009 in Darcy – Weisbach Formula.

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- Q6. A thin plate is moving in still atmospheric air at a velocity of 5 m/s. The length of plate is 0.6 m and width 0.5 m. Calculate (i) thickness of boundary layer at end of the plate, and (ii) drag force on side of the plate. Take density of air as 1.24 kg/m^3 and kinematic viscosity 0.15 stokes.
- Q7. Compare the Impulse and Reaction Turbine with special reference to construction, working, output and applications.

Part – C

[Marks: 12 each]

- Q8. The water is flowing through a pipe having diameter 20 cm and 10 cm at sections 1 and 2 respectively. Rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24 N/cm^2 , find the intensity of pressure at section 2.

OR

What are performance curves? Discuss the importance and plotting of these curves for Impulse and Reaction Turbines.

- Q9. Show that for a flow governed only by gravity, inertia and pressure forces, the ratio of rates of flow in two dynamically similar systems equals to $5/2$ power of the length ratio.

OR

A reaction turbine works at 450 r.p.m. under a head of 120 meters. Its diameter at inlet is 120 cm and the flow area is 0.4 m^2 . The angles made by absolute and relative velocities at inlet are 20° and 60° respectively with tangential velocity. Determine:

- Volume Flow Rate
- Power Developed
- Hydraulic Efficiency.
