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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ME) (Sem. – 4)

FLUID MACHINES

Subject Code: BTME402-18

M Code: 77547

Date of Examination : 05-01-2023

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:
 - a) What do you understand by governing of a reaction turbine?
 - b) What is function of surge tank?
 - c) What are multistage pumps?
 - d) What is air lift?
 - e) What do you understand by net positive suction head?
 - f) Explain torque convertor.
 - g) What is intensifier? Where is it used?
 - h) Define slip in reciprocating pump.
 - i) What is differential accumulator?
 - j) What is hydraulic press?

2. A Pelton wheel having
on the Pelton wheel is 84.0m. If the
is $0.12\text{m}^3/\text{s}$. Determine
- Power available at the nozzle
 - Hydraulic efficiency of the turbine
3. What is cavitation? On what factors does the cavitation in water turbines depend?
4. The diameter and width of a centrifugal pump impeller are 50cm and 2.5cm. The pump runs at 1200rpm. The suction head is 6m and the delivery head is 40m. The frictional drop in motion is 2m and in the delivery 8m. The blade angle at out let is 30° . The manometric efficiency is 80% and the overall efficiency is 75%. Determine the power required to drive the pump. Also calculate the pressures at the suction and delivery side of the pump.
5. Explain why priming is essential before starting a centrifugal pump.
6. What are main components of a reaction turbine? Describe their functions. Compare a Francis Turbine with Kaplan Turbine.

SECTION-C

7. Derive Euler's momentum equation for hydraulic machines.
8. Explain the following:
- Suction head
 - Delivery head
 - Static head
 - Manometric head
 - Total head
 - Net positive suction head
 - Euler's head
9. Determine the power available and number of turbines required for a hydroelectric station with following data:
- Head available = 60m
- Water available = $33\text{m}^3/\text{s}$
- Specific speed of turbines to be installed = 190
- Rpm of turbines = 500
- Overall efficiency = 82%

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.

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SECTION-B

2. A Pelton wheel having a mean bucket diameter of 1.2m is running at 1000 r.p.m. The net head on the Pelton wheel is 840m. If the side clearance angle is 15° and discharge through the nozzle is $0.12\text{m}^3/\text{s}$. Determine:
 - a) Power available at the nozzle
 - b) Hydraulic efficiency of the turbine.
3. What is cavitation? On what factors does the cavitation in water turbines depend?
4. The diameter and width of a centrifugal pump impeller are 50cm and 2.5cm. The pump runs at 1200rpm. The suction head is 6m and the delivery head is 40m. The frictional drop in suction is 2m and in the delivery 8m. The blade angle at out let is 30° . The manometric efficiency is 80% and the overall efficiency is 75%. Determine the power required to drive the pump. Also calculate the pressures at the suction and delivery side of the pump.
5. Explain why priming is essential before starting a centrifugal pump.
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SECTION-C

7. Derive Euler's momentum equation for hydraulic machines.
8. Explain the following:
 - a) Suction head
 - b) Delivery head
 - c) Static head
 - d) Manometric head
 - e) Total head
 - f) Net positive suction head
 - g) Euler's head
9. Determine the power available and number of turbines required for a hydroelectric station with following data:

Head available = 60m

Water available = $33\text{m}^3/\text{s}$

Specific speed of turbines to be installed = 190

Rpm of turbines = 500

Overall efficiency = 82%

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