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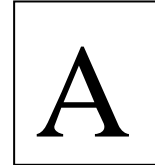
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SNS College of Technology, Coimbatore-35.
(Autonomous)



B.E/B.Tech- Internal Assessment -III
Academic Year 2022-2023 (ODD)
Third Semester
Common to all Branches
19MEB201& Fluid Mechanics and Machinery



Time: 1^{1/2} Hours

Maximum Marks: 50

Answer All Questions

CO Blooms

PART - A (5 x 2 = 10 Marks)

- | | | | | |
|----|---|-----|-----|---|
| 1. | What are the functions of a draft tube? | CO4 | REM | 2 |
| 2. | Differentiate between the turbines and pumps. | CO4 | UND | 2 |
| 3. | What are the factors causing cavitation? | CO4 | EVA | 2 |
| 4. | Define the hydraulic efficiency of a turbine. | CO5 | REM | 2 |
| 5. | When will you select a reciprocating pump? | CO5 | APP | 2 |

PART – B (13 +13+14 = 40 MARKS)

- | | | | | | |
|----|-----|--|-----|-----|----|
| 6. | (a) | A reaction turbine works at 450rpm under a head of 120m. Its diameter at inlet is 1.2 m and the flow area is 0.4 m ² . The angles made by absolute and relative velocities at inlet are 20 ⁰ and 60 ⁰ , respectively with tangential velocity. Determine (i) the volume flow rate, (ii) the power developed and (iii) hydraulic efficiency. Assume radial discharge at the outlet | CO4 | APP | 13 |
| | | (or) | | | |
| | (b) | Explain in detail about the Working and Construction of Kaplan Turbine with a neat Diagram. | CO4 | REM | 13 |
| 7. | (a) | A double acting reciprocating pump, running at 40 rpm, is discharging 1.0 m ³ of water per minute. The pump has a stroke of 40 cm. The diameter of the piston is 20 cm. The delivery and suction heads are 20 m and 5 m respectively. Find the slip of the pump and horse power required to drive the pump. | CO5 | UND | 13 |

(or)

- (b) Find the number of pumps required to take water from a deep well under a total head of 85 m. All pumps are identical and running at 800 rpm and specific speed of each pump is 25 while the rated capacity of each pump is 0.16 m³/s
- CO5 ANA 13
8. (a) 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 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 turbine.
- CO4 ANA 14
- (or)
- (b) A single acting reciprocating pump, running at 50 rpm, delivers 0.01 m³/s of water. The diameter of the piston is 200 mm and stroke length 400 mm.
- Determine:
- CO5 EVA 14
- i) The theoretical discharge of the pump
ii) Co-efficient of discharge
iii) Slip and the percentage slip of the pump.

Abbreviations: UND-Understanding, REM-Remembering, ANA-Analysing, APP-Applying, EVA-Evaluating, CRE-Creating

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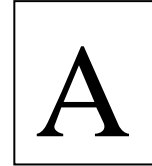
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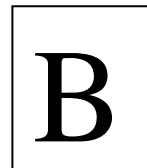
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| 4. What is meant by priming of pumps? | CO5 | REM | 2 |
| 5. When do negative slip occur in reciprocating pumps? | CO5 | REM | 2 |

PART – B (13 +13+14 = 40 MARKS)

- | | | | |
|---|-----|-----|----|
| 6. (a) A pelton wheel is to be designed for a head of 60m when running at 200 r.p.m. The pelton wheel develops 95.6475 KW shaft power. The velocity of the buckets = 0.45 times the velocity of the jet, overall efficiency = 0.85 and coefficient of the velocity is equal to 0.98. | CO4 | APP | 13 |
| (or) | | | |
| (b) Explain in detail about the Working and Construction of Pelton Wheel with a neat Diagram. | CO4 | REM | 13 |
| 7. (a) A Kaplan turbine working under a head of 20 m develops 11772 kW. The outer diameter of the runner is 3.5 m and hub diameter 1.75 m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbine are 88% and 84% respectively. If the velocity of whirl is zero at outlet determine. (i) Runner inlet and outlet vane angles at the extreme edge of the runner and (ii) Speed of the turbine. | CO5 | UND | 13 |
| (or) | | | |
| (b) A pump is required to lift 600 kg of water per minute from a wall 25m deep and to eject it with a speed of 50 ms ⁻¹ . Calculate the power required to complete the above task? | CO5 | ANA | 13 |

8. (a) A kaplan turbine runner is to be designed to develop 7357.5 kW shaft power. The net available head is 5.5 m. Assume that the speed ratio is 2.09 and flow ratio is 0.68. The overall efficiency is 60%. The diameter of the Boss is 1/3 of the diameter of the runner. Find the diameter of the runner, its speed, and its specific speed
- CO4 APP 14
- (or)
- (b) The diameter and stroke length of a single acting reciprocating pump are 12cm and 20cm respectively. The lengths of suction and delivery pipes are 8m and 25 m respectively and their diameters are 7.5cm. If the pump is running at 40 r.p.m and suction and delivery heads are 4m and 14 m respectively .Find the pressure head in the cylinder:
- CO5 EVA 14
- I. At the beginning of the suction and delivery stroke
 - II. In the middle of suction and delivery stroke
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