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B.Tech.(ME) (2011 Onwards) (Sem.–6) FLUID MACHINERY Subject Code :BTME-603 Paper ID : [A2363]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION 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 has to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

- l. Write briefly :
 - (a) Write the difference between impulse and reaction turbine.
 - (b) List the classification of reciprocating pumps.
 - (c) State the meaning of scale effect.
 - (d) Write the purpose of air vessels.
 - (e) Define net positive suction head with its expression.
 - (f) State the function of surge tanks.
 - (g) Define the purpose of intensifier.
 - (h) Write the difference between fluid coupling and torque converter.
 - (i) Define the specific speed of a centrifugal pump.
 - (j) State the advantages of multi-stage pumps.

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SECTION-B

- 2. What are the various parts of centrifugal Pump? Explain with neat sketches.
- 3. A double jet Pelton wheel operates under a 40 m head and develops 735 kW brake power when running at 450 rpm. Make calculations for the flow rate and diameter of the nozzle jet. Assume overall efficiency 85 % and coefficient of velocity 0.98.
- 4. Discuss the phenomenon of cavitation in reaction turbines. How we can reduce cavitation? Discuss with the help of Thoma's Cavitation factor.
- 5. What are the uses of draft tube? Describe with neat sketches different type of draft tube.
- 6. Prove that Pelton turbine is a low specific speed turbine.

SECTION-C

- 7. For a Francis turbine, Net Head H = 60 m, speed N = 700 rpm, Shaft Power = 294.3 kW, overall efficiency = 84%, hydraulic efficiency = 93%, flow ratio = 0.20, breadth ratio = 0.1, outer diameter of runner = $2 \times$ inner diameter of runner. The thickness of vanes occupies 5% of circumferential area of runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
 - (i) Guide blade angle
 - (ii) Runner vane angle at inlet and outlet
 - (iii) Diameter of runner at inlet and outlet
 - (iv) Width of wheel at inlet
- 8. A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 rpm works against a total head of 40 m. The velocity of flow through impeller is constant and equal to 2.5 m/sec. The vanes are set back at an angle of 40° at outlet. If the outer diameter of impeller is 500 mm, determine :
 - (i) Vane angle at inlet
 - (ii) Work done by impeller on water per second
 - (iii) Manometric efficiency.
- 9. Write short note on :
 - (i) Fluid coupling and Torque converter
 - (ii) Design of Kaplan turbine