

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

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

I. 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.

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