

**B.Tech. SEM -IV Mechanical 2014 Course (CBCS) : SUMMER - 2019**

**SUBJECT: TURBOMACHINARY**

Day: Thursday  
Date: 30/05/2019

**S-2019-2625**

Time: 10.00 AM TO 01.00 PM  
Max. Marks: 60

**N.B:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

**Q.1** Explain construction and working of Pelton wheel with neat sketch. Explain general energy equation for turbine. (10)

**OR**

**Q.1** Define speed ratio, jet ratio, flow ratio. Derive an expression for maximum hydraulic efficiency for Pelton turbine. (10)

**Q.2** 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  $0.4 \text{ m}^2$ . The angles made by absolute and relative velocities at inlet are  $20^\circ$  and  $60^\circ$  respectively with the tangential velocity. Determine. (10)

a) The volume flow rate b) The power developed

**OR**

**Q.2** Define the term 'Governing of a turbine'. Describe with a neat sketch the working of an oil pressure governor for water turbines. (10)

**Q.3** What are the methods of governing a steam turbine? Describe any one method of governing steam turbines. (10)

**OR**

**Q.3** Classify steam turbines in detail. Explain pressure- velocity compounding of an impulse turbine with neat sketch. (10)

**Q.4** A centrifugal pump is running at 1000 r.p.m. The outlet vane angle of the impeller is  $45^\circ$  and velocity of flow at outlet is 2.5m/s. The discharge through the pump is 200 liters/s. when the pump is working against a total head of 20m. In the manometric efficiency of the pump is 80%. Determine i) The diameter of the impeller ii) the width of the impeller at outlet. (10)

**Q.4** Explain construction and working of centrifugal pump with neat sketch. Also explain NPSH and Thomas cavitations factor for centrifugal pump. (10)

**OR**

**Q.5** With a neat sketch explain the essential parts of a centrifugal compressor. Also explain with neat sketch the inlet and exit velocity triangles for various types of blades. (10)

**Q.5** A centrifugal compressor running at 2000 r.p.m. receives air at  $17^\circ\text{C}$ . If the outer diameter of the blade tip as 750 mm. find the temperature of the air leaving the compressor. Take  $C_p = 1 \text{ kJ/kg K}$  (10)

**Q.6** What are the basic requirements of compressor for aircraft applications? Do axial flow compressors meet them? Explain. Discuss enthalpy- entropy diagram of an axial compressor. (10)

**OR**

**Q.6** Explain construction and working of axial compressor with neat sketch. Also Discuss performance characteristics of Axial compressor. (10)

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