

Seat No. **OCT-NOV 2025 WINTER EXAMINATION****1154 B.Tech. CBCS****Sub. Name: Fluid and Turbo Machinery****Sub. Code: 63362/79121/79409****Day and Date: Tuesday ,09-12-2025****Total Marks: 70****Time: 10:30 AM To 01:00 PM**

Instructions: 1. Assume suitable data wherever necessary and mention it boldly
 2. Figures to the right indicate full marks
 3. Use of Scientific calculator is allowed

Special Inst.: Question number 4 and 8 are compulsory
 Attempt any Two from question number 1,2,3
 Attempt any Two from question number 5,6,7

- Q1) Attempt the following questions [10]**
 a) Define hydraulic turbine and classify hydraulic turbine
 b) Explain construction & working of Pelton wheel turbine
- Q2) Attempt the following questions [10]**
 a) Write a short note on draft tube
 b) Explain difference between impulse and reaction turbine
- Q3) Attempt the following questions [10]**
 a) Define and classify pumps
 b) Explain minimum starting speed of centrifugal pump
- Q4) Attempt Any Two from the following questions [16]**
 a) A Pelton wheel is to be designed for following specifications, Shaft Power= 11772 kW, Head = 380m, Speed = 750 r.p.m., Overall efficiency = 86 %. Jet diameter is not exceeded (1/6)th of the diameter of wheel.
 Determine,
 i. Diameter of wheel
 ii. Diameter of wheel and jet
 iii. Number of jet required
 iv. Also draw velocity triangle diagram
 Assume, Coefficient. of velocity is 0.985 & Speed ratio is 0.45
- b) The hub diameter of Kaplan turbine, working under a head of 12 m, is 0.35 times the diameter of the runner. The turbine is running at 100 rpm. If the vane angle of the extreme edge of the runner at outlet is 15° and flow rate is 0.6, find
 i. Diameter of the runner
 ii. Diameter of the boss
 iii. Discharge through the runner

c) A centrifugal pump is running at speed 1550 rpm and discharge is $0.220\text{m}^3/\text{s}$ against a head of 27m. The impeller diameter is 300mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.

Q5) Attempt the following questions [10]

- a) What is Compressor? What are the applications of compressed air?
- b) Obtain the condition for minimum work in two stage compressor.

Q6) Attempt the following questions [10]

- a) Compare between reciprocating and centrifugal compressor.
- b) Explain with neat sketch working of axial flow compressor.

Q7) Attempt the following questions [10]

- a) What are the applications of gas turbine?
- b) Explain the thermodynamic processes in actual gas turbine cycle with T-s diagram.

Q8) Attempt Any Two from the following questions [14]

a) A single stage reciprocating compressor takes in $7.5\text{ m}^3/\text{min}$ of air at 1 bar and 27°C and delivers it at 5 bar. The clearance is 5% of stroke. The expansion and compression index is 1.3. Calculate:

- i. The temperature of delivery air
- ii. Volumetric Efficiency
- iii. Power of compressor

b) A Rotary compressor working between 1 bar and 2.5 bar has internal and external diameters of impeller as 300 mm and 600mm respectively. The vane angle at inlet and outlet are 30° and 45° respectively. If the air enters the impeller at 15 m/s. Find speeds of impeller in rpm and workdone by compressor per kg of air.

c) A constant pressure open gas cycle turbine plant works between temperature 15°C and 700°C and pressure ratio of 6. Find the mass of air circulating in the installation, if it develops 1100 KW. Also find the heat supplied by the heating chamber.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (101) Bachelor of Engineering (63362) Fluid And Turbo Machinery Part 2 SEM 4
- 2] (101) Bachelor of Engineering (79409) Fluid and Turbo Machinery Part 2 SEM 4
- 3] (1154) B.Tech. CBCS (79121) Fluid and Turbo Machinery Part 2 SEM 4

339374