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OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Applied Thermodynamics

Sub. Code: 63352/73205/77736

Day and Date: Friday ,05-12-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

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

Special Inst.: Use of steam table,Mollier chart are allowed

Q1) Solve the following Questions **[11]**

a. Define 1.Available Energy 2. Unavailable Energy 3. Dead State **[6]**

OR

Give the statement of Zeroth law of thermodynamics and first law of thermodynamics? What is PMM-I explain briefly?

b. Find COP and heat transfer rate in condenser of a Refrigerator in kJ/h, which has a Refrigeration capacity of 12000 kJ/h when power input is 0.75 kW? **[5]**

Q2) Solve the following Questions **[12]**

a. Explain Carnot cycle for steam power plant with the help of P-V, T-S and h-s diagram, what are the limitations of Carnot Cycle **[5]**

OR

Explain the following terms in case of steam turbine 1.Specific steam consumption 2.Work ratio

b. In a steam power cycle, the steam supply is at 15 bar and dry and saturated. The condenser pressure is 0.4 bar. Calculate the Carnot and Rankine efficiencies of the cycle. Neglect pump work. **[7]**

Q3) Solve the following Questions **[12]**

a. How will you classify condensers? In what respect a jet condenser differs from a surface condenser? **[6]**

b. The observations recorded during the trial on steam condenser are given below **[6]**

i. Condenser vacuum=685 mm of Hg
ii. Barometric reading=765 mm of Hg

iii. Mean condenser temperature=34°C
iv. Hot well temperature= 28°C
v. Circulating of cooling water Inlet temperature =18°C
vi. Circulating of cooling water outlet temperature =30°C
vii. Condensate formed per hour =1750 kg
viii. Quantity of cooling water=1300 kg/min **Calculate** a) Vacuum efficiency b) Condenser efficiency

Q4) Solve the following Questions **[12]**

a. What is the function of the nozzle? Describe types of steam nozzles with neat sketch. **[6]**

b. Steam at a pressure of 10 bar and 0.9 dry discharge through nozzle having throat area of 450 mm^2. If the back pressure is 1 bar find i) Exit velocity of the steam ii)Throat velocity of steam, for maximum discharge **[6]**

OR

Define: i) Nozzle efficiency ii) Coefficient of discharge iii) Velocity coefficient

Q5) Solve the following Questions **[12]**

a. What is compounding? Explain pressure compounding with neat sketch in detail**.** **[6]**

b. An impulse turbine has exit steam velocity from nozzle equal to 900m/s and nozzle angle is 20°. The main blade speed is 300m/s. The blades are equiangular. The mass flow rate of steam is 0.33kg/s and blade velocity coefficient is 0.85. Calculate, i)The blade angles ii) The power developed **[6]**

Q6) Solve the following Questions **[11]**

a. What are the losses in steam turbine? **[5]**

b. The out angle of Parsons reaction turbine is 20° and axial velocity of flow is 0.5times the mean blade velocity. Draw the velocity triangle. The mean diameter is 0.71 meter and speed of rotation is 3000rpm. Find i)The inlet angle of blade ii) The power developed for steam flow rate of 27.58 kg/s. **[6]**

OR

Draw and explain the velocity diagram and pressure –velocity distribution diagram for reaction turbine.

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 (63352) Applied Thermodynamics Part 2 SEM 3

2] (101) Bachelor of Engineering (77736) Applied Thermodynamics Part 2 SEM 3

3] (1154) B.Tech. CBCS (73205) Applied Thermodynamics Part 2 SEM 3