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B. Tech. EXAMINATION, 2020

(Fourth Semester)

(B Scheme)

(Re-appear Only)

ME

ME210B

ENERGY CONVERSION

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Use of Mollier diagram and Steam Tables is allowed.

Unit I

1. (a) What do you understand by Stochiometric air fuel ratio ? Discuss the significance of excess air in combustion. **7**

(b) Explain the different type losses in steam boilers with the help of heat balance sheet. **8**

2. (a) What do you understand by artificial draft ? Explain the different means of producing artificial draft. **8**

(b) Explain in brief function and location of boiler mountings and accessories. **7**

Unit II

3. Discuss the effect of operating conditions on the performance of Rankine cycle. **15**

4. Derive a relation for calculating mass discharge and hence condition for maximum discharge through a steam nozzle. Explain the significance of critical pressure ratio. **15**

Unit III

5. The enthalpy drop in the nozzle of an impulse turbine was 45 kJ/kg. The nozzle is inclined at 14^{o} to the wheel tangent. The average diameter of the wheel is 0.3 m. The wheel runs at 10,000 rpm. Determine the blade inlet angle for shockless entry. If the blade exit angle is equal to the inlet angle, determine the work done/kg and also the axial thrust for a flow of 1 kg/sec. **15**

6. Discuss the concept of multistaging in steam turbines. What do you understand by stage efficiency, overall efficiency and reheat factor ? **15**

Unit IV

7. (a) Discuss the role of condenser in steam power plants. Compare between jet and surface condensers. **8**

(b) In a steam condenser, the average temperature is $34^{o}C$. The vacuum is 680 mm Hg when the barometer reads 762 mm Hg. The water enters at $25^{o}C$ and leaves at $32^{o}C$. Determine the condenser efficiency. Also determine vacuum efficiency. **7**

8. (a) Define volumetric efficiency of reciprocating air compressor and derive an expression for the same. **10**

(b) Discuss the advantages of multistage compression. **5**