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**SUBJECT CODE NO:- H-133**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E. (Mech/Prod)**  
**Thermodynamics -II**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

N.B Please check whether you have got the right question paper.

- N.B
- 1) Attempt any three questions from each section.
  - 2) Use of steam table, mollier diagram permitted.
  - 3) Assume suitable data, if required.

**Section A**

- Q.1 In a boiler trial of one hour duration, following observations are made, steam generated = 5250 kg 13  
 Fuel burnt = 695 kg  
 Calorific value of fuel = 30,200 Kj/Kg  
 Steam condition = 0.94 dry  
 Boiler pressure = 12 bar  
 Temperature at hot well = 47°C  
 Temp. of steam leaving super heater = 240°C  
 Calculate (i) Equivalent evaporation without and with super heater  
 (ii) Boiler efficiency with and without super heater
- Q.2 a) Explain construction and working of Cochran Boiler. 07  
 b) Derive the condition for maximum discharge through chimney. 06
- Q.3 a) A 40 meter high chimney is discharging flue gases at 350°C, when the ambient temperature 09  
 is 30°C. The quantity of air supplied is 18 Kg/kg of fuel burnt.  
 Determine:- i) Draught produced in mm of water  
 ii) Velocity of flue gases leaving chimney.
- b) Discuss various types of nozzles. 04
- Q.4 a) Explain isentropic flow through nozzle. 05  
 b) A nozzle is designed to expand steam at rate of 0.1 Kg/s from 5 bar, 210°C to 1 bar. 08  
 Determine exit area of nozzle neglect inlet velocity.
- Q.5 Short note on (any two) 14  
 i) IBR Laws  
 ii) Artificial draught  
 iii) Metastable flow through nozzle.

## Section B

- Q.6 a) Explain Ejector condenser with neat sketch. 07
- b) Differentiate between jet condenser and surface condenser. 06
- Q.7 a) Explain Carnot cycle by using P-V & T-S diagram. 05
- b) Discuss in detail the effect of inlet pressure and back pressure on performance of Rankine cycle. 08
- Q.8 a) A steam power plant operating on Rankine cycle works between pressures of 40 bar and 0.05 bar. If steam supplied to turbine is dry saturated find thermal efficiency of cycle. 07
- b) Describe centrifugal compressor with neat sketch. 06
- Q.9 A single-stage, single acting air compressor delivers air at 7 bar. The pressure and temp. at the end of suction stroke are 1 bar and 27°C. It delivers 2 m<sup>3</sup> of free air per minute when the compressor is running at 300 rpm. The clearance volume is 5% of stroke volume. The index of compression is 1.3 and index of expansion is 1.35. Calculate. 13
- Volumetric efficiency
  - Indicated power
  - Brake power, if mechanical efficiency is 80%.
- Q.10 Short note on:- (Any two) 14
- Cooling towers
  - Feed water heaters
  - Intercoolers