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**SUBJECT CODE NO:- E-265**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech) (CGPA) Examination Nov/Dec 2017**  
**Thermodynamics-I**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q.no.1 & Q.no.6 from section A & B are compulsory
  - 2) Solve any two question from each section A & B
  - 3) Use of steam table & mollier diagram allowed
  - 4) Assume suitable data if required

**Section A**

- Q.1 Solve any five 10
- i) Explain flow work
  - ii) Explain control volume
  - iii) Modify SFEE for isentropic turbine
  - iv) State Carnot theorem
  - v) Explain PMM-I
  - vi) Define Available energy
  - vii) Differentiate between steady flow and non flow process
- Q.2 07
- a) Explain Heat engine refrigerator and Heat Pump
  - b) 12kg per minute of air is delivered by compressor. The inlet and outlet conditions of air are  $C_1=12\text{m/s}$ ,  $P_1= 1\text{bar}$  and  $C_2= 90\text{m/s}$   $P_2=8\text{ bar}$  . The increase in enthalpy of air passing through compressor is 150 kJ/kg and heat loss to surroundings is 700KJ/min find power required to drive the compressor
- Q.3 06
- a) Discuss limitations of first law of thermodynamics
  - b) A cyclic heat engine operates between a source temperature of 1000°C and sink temperature of 50°C find least rate of heat rejection per KW net output of the engine
- Q.4 07
- a) Explain entropy & irreversibility
  - b) Explain principle of increase in entropy of universe 08
- Q.5 Write short note on ( any three) 15
- i) PMM-II
  - ii) Thermodynamics temp. scale
  - iii) Clausius theorem
  - iv) Availability in steady flow and non- flow processes

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Section-B

- Q.6 Solve any five 10
- i) Explain pure substance
  - ii) Write assumptions in power cycles
  - iii) Define triple point
  - iv) Define HCV and n LCV
  - v) Draw PV and T-S diagram of Brayton cycle
  - vi) Explain mean effective pressure
  - vii) Explain critical point
- Q.7
- a) Explain phase change diagram of pure substance 06
  - b) The minimum pressure and temp. in an otto cycle are 100KPa and 27°C the amount of heat added is 1500 KJ/KG. calculate pressure & temp. at all point assuming compression ratio= 8 09
- Q.8
- a) Explain steps to convert volumetric analysis to mass analysis and vice versa 06
  - b) A vessel having capacity of 0.05m<sup>3</sup> contains mixture of saturated water & Saturated steam at 245°C the mas of liquid presents is 10Kg find the followings 09
    - a) Pressure (b) the mass
    - b) Specific volume (d) specific enthalpy (e) sp. entropy
- Q.9 % composition of liquid fuel is C=85% and H<sub>2</sub>=15% by mass calculate 15
- 1) Mass of air required per kg of fuel
  - 2) Product of combustion by volume is 15% excess air is supplied
- Q.10 Short note on ( any three) 15
- i) Orsat apparatus
  - ii) Ericsson cycle
  - iii) Throttling calorimeter
  - iv) Carnot cycle