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**Question Paper Code: 34074**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Mechanical Engineering

01UME404 – THERMAL ENGINEERING

(Regulation 2013)

(Use of Steam table, Psychrometric chart are permitted)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Sketch the PV and TS diagram of Diesel cycle.
2. Define mean effective pressure.
3. Differentiate between brake power and indicated power of an IC engine.
4. What are the exhaust emissions from a diesel engine?
5. What is critical pressure ratio of a steam nozzle?
6. What is blading efficiency?
7. Define volumetric efficiency.
8. Define clearance ratio of an air compressor.
9. What is meant by COP of refrigeration?
10. List two desirable properties of refrigerants.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive an expression for the air standard efficiency of Brayton (Joule) cycle in terms of pressure ratio. (16)

Or

(b) Draw the actual and theoretical p-v diagrams of a four stroke diesel engine and compare them. (16)

12. (a) With a neat sketch explain the working principle of a simple carburetor. (16)

Or

(b) Explain the working of 4-stroke cycle diesel engine with neat sketch. (16)

13. (a) What is velocity compounding? List advantages and limitations of velocity compounding. (16)

Or

(b) Steam at a pressure of 5 bar and dryness fraction of 0.95 enters the nozzle and expands isentropically till the exit pressure of 1 bar. Determine the change in enthalpy and dryness fraction of steam leaving the nozzle. Also calculate the velocity of steam at the nozzle exit and exit area of the nozzle if the flow rate of steam is 1.1 Kg/s. (16)

14. (a) In a two stage compressor in which inter cooling is perfect, prove that work done in the compressor is minimum when the pressure in the inter cooler is geometric mean between the initial and final pressure. Draw the P-V and T-S diagram for two stage compression. (16)

Or

(b) A single stage single acting reciprocating air compressor runs at 350rpm is used to compress air from 1 bar pressure to 6 bar pressure according to the law  $PV^{1.35} = C$ . The bore and stroke length of the cylinder are 200mm and 300 mm respectively. If the clearance volume is 5% of the stroke volume, determine : (i) Power required to run the compressor (ii) Mean effective Pressure. (16)

15. (a) Explain the construction and working of vapour compression refrigeration system with neat sketch. (16)

Or

(b) With help of a suitable sketch explain the working of lithium bromide-water based vapour absorption system. Also list the advantages and disadvantages of vapour absorption systems. (16)