Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 31744

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

Fourth Semester

Mechanical Engineering

01UME404 – THERMAL ENGINEERING

(Regulation 2013)

(Use of Steam table, Refrigration table, Mollier chart, Psychrometric chart are permitted)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Draw the P-v and T-s diagrams of a dual cycle and write the various processes.

2. What is meant by mean effective pressure?

3. What are the basic components of an IC engine?

4. What are the exhaust emissions from a diesel engine?

5. What are the factors reducing the final velocity of steam in nozzle flow?

6. What is the difference between impulse and reaction turbine?

7. Define volumetric efficiency.

8. List the advantages of multistage compressor over single stage compressor.

9. Give the advantages of subcooling and superheating.

10. List two desirable properties of refrigerants.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the expression for the air standard efficiency of a diesel cycle.   (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 phenomena of knocking in diesel engines. What are the different factors which influencing the knocking. (16)

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

Or

(b) Steam at 10.5 *bar* and 0.95 dryness is expanded through a convergent-divergent nozzle. The pressure of steam leaving the nozzle is 0.85 *bar*. Find, (i) velocity of steam at throat for maximum discharge (ii) area at exit (iii) steam discharge if the throat area is 1.2 *cm²*. Assume the flow is isentropic and there are no friction losses. Take *n=1.135*. (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 compressor delivers 15m³ of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follow the law is pv^{1.3}= constant and clearance volume is 1/16th of swept volume; find the diameter and the stroke of compressor. Take L/D = 1.5. The temperature and pressure of air at the suction are 20°C and 1 bar respectively. (16)

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

Or

(b) Explain with neat sketch about the Vapour Li-Br vapor absorption Refrigeration system. (16)

_____

31744