Reg. No. : | | | | | | | | | | |

Question Paper Code: 41744

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

Fourth Semester

Mechanical Engineering

14UME404 - THERMAL ENGINEERING

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

(Steam table with Mollier charts are permitted)

PART A - (10 x 1 = 10 Marks)

1. The thermodynamic cycle working with air as working cycle is known as

    (a) induction stoke   (b) compression stoke
    (c) power stoke   (d) exhaust stoke

2. Constant volume cycle refers to

    (a) Diesel cycle   (b) Brayton cycle
    (c) Otto cycle   (d) Dual cycle

3. The power developed inside the cylinder is called

    (a) Mechanical efficiency   (b) Brake power
    (c) Indicated power   (d) Thermal efficiency

4. The ratio between Indicated power and Brake power is called

    (a) Brake thermal efficiency   (b) Volumetric efficiency
    (c) Mechanical efficiency   (d) Indicated thermal efficiency

5. Increasing the velocity and decreasing the pressure is done by
    (a) Diffuser   (b) Turbine   (c) Compressor   (d) Nozzle

6. De-Laval turbine is an example of

    (a) Impulse turbine   (b) Reaction turbine

    (c) Low head turbine   (d) Middle head turbine

7. For complete intercooling, the temperature at the inlet and exit of the compressor are

    (a) $T_i<T_e$ (b) $T_i>T_e$ (c) $T_i = T_e$ (d) $T_i \neq T_e$

8. If the temperature of air leaving the intercooler is equal to the original inlet temperature

    (a) Incomplete intercooling   (b) Imperfect intercooling

    (c) Perfect intercooling   (d) No intercooling

9. The ratio between Refrigerating effect and work done is called as

    (a) Ton of refrigeration   (b) Compression refrigeration

    (c) Coefficient of Performance   (d) Absorption refrigeration

10. Temperature measured by ordinary thermometer is called

    (a) Dry bulb temperature   (b) Wet bulb temperature

    (c) Dew point temperature   (d) Saturation temperature

PART - B (5 x 2 = 10 Marks)

11. Name the various "gas power cycles".

12. What is function of cam shaft and crank shaft?

13. What is critical pressure ratio of a steam nozzle?

14. What the use is of inter cooler?

15. Define ton of Refrigeration.

PART - C (5 x 16 = 80 Marks)

16. (a) Illustrate the P-V diagram and T-S diagram of Diesel cycle and deduce the expression for air standard efficiency.   (16)

Or

(b) The minimum pressure and temperature in an Otto cycle are 100 kPa and 27^{0}C. The amount of heat added to the air per cycle is 1500 KJ/Kg. i. Determine the pressure and temperature at all points of the air standard Otto cycle. ii. Also calculate the specific work and thermal efficiency of the cycle for the compression ratio of 8:1.Take for air $C_v = 0.72$ kJ/kgK & $\gamma = 1.4$.   (16)

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17. (a) Explain the construction and working principle of any one of ignition system with neat sketch. (16)

Or

(b) What are the different methods of lubrications available in I.C. Engines? Explain the pressurised lubrication system with neat sketch. (16)

18. (a) Briefly discuss the pressure and velocity compounding in turbines. (16)

Or

(b) Steam at 10.5 bar and 0.95 bar dryness is expanded through a convergent– divergent nozzle. The pressure of steam leaving the nozzle is 0.85 bar. Find its velocity of steam at throat for max. .Discharge, the throat area and steam discharge if the throat area is 1.2cm^2. Assume the flow is isentropic and there are no friction losses. Take n= 1.135. (16)

19. (a) Explain with neat sketch the construction and working roots blower and vane type compressor. (16)

Or

(b) Describe the construction and working of multi stage compressor and discuss the perfect and imperfect inter cooling. (16)

20. (a) An office is to be air-conditioned for 50 staffs when the outdoor conditions are 30^0 C DBT and 75% RH if the quantity of air supplied is 0.4 m^3/min/person, find the following.
(i) Capacity of the cooling coil in tons of refrigeration
(ii) Capacity of the heating coil in KW
(iii) Amount of water vapour removed per hour. Assume that required air inlet conditions are 20^0C DBT and 60% RH, air is conditioned first by cooling and dehumidifying and then by heating.
(iv) If the heating coil surface temperature is 25^0 C, find the bypass factor. (16)

Or

(b) Explain the construction and working of Ammonia – Water vapour absorption system (16)

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