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Question Paper Code : 51638

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Fifth Semester

Mechanical Engineering

ME 2301/ME 51/ME 1351 A/10122 ME 402 — THERMAL ENGINEERING

(Regulation 2008/2010)

(Common to PTME 2301 – Thermal Engineering for B.E. (Part-Time) Mechanical Engineering Fourth Semester – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is an air standard efficiency?
2. Define (a) Compression ratio (b) cut off ratio.
3. What is a Carburetor? State any two functions of Carburetor.
4. Define the term Brake Power.
5. What are the effects of friction on the flow through a steam nozzle?
6. Define degree of reaction?
7. Draw the P-V diagram of a two stage reciprocating air compressor.
8. What is meant by inter cooler?
9. State the unit of Refrigeration and any two properties of good refrigerant.
10. Define RSHP, RTH.

PART B — (5 × 16 = 80 marks)

11. (a) An air-standard Diesel cycle has compression ratio of 8 and the heat transferred to the Working fluid is 1800 kJ/kg. The pressure and temperature at the beginning of the compression Stroke are 1 bar and 300K respectively. Calculate (i) the pressure and temperature at Each point of the cycle, (ii) the air-standard efficiency and (iii) the mean effective pressure assume the values of C_p and R as 1.005 and 0.287.

Or

- (b) Derive an expression for air-standard efficiency of dual-combustion cycle.

12. (a) Draw a neat sketch of an injector of diesel engine and explain its working.

Or

- (b) What are the different methods of lubricating IC Engine? Explain the pressure system of lubrication with a neat sketch

13. (a) Steam enters the blade row of an impulse turbine with a velocity of 600m/s at an angle of 25° to the plane of rotation of the blades the mean blade speed is 250m/s. The blade Angle at the exit side is 30° . The blade friction loss is 10%. Determine (i) The blade angle inlet. (ii) The work done per kg of steam (iii) blade efficiency.

Or

- (b) The flow rate through steam nozzle with isentropic flow from pressure of 13 bar was found to be 60 kg/min. steam is initially saturated. Determine the throat area. If the flow is super saturated, determine the increase in the flow rate.

14. (a) Derive an expression for volumetric efficiency of an air compressor.

Or

- (b) Explain the working Principle of an intercooler with neat sketch and Explain the Working principle of an axial flow compressor.

15. (a) Explain briefly simple vapour absorption system Give the comparison between vapour compression system and vapour adsorption System.

Or

- (b) An office is to be air-conditioned for 50 staff when the outdoor conditions are 30°C DBT and 75% RH if the quantity of air supplied is $0.4 \text{ m}^3 / \text{min} / \text{person}$, find the following

- (i) Capacity of the Cooling coil in tons of refrigeration. (4)
- (ii) Capacity of the heating coil in kW. (4)
- (iii) Amount of water vapour removed per hour. (4)

Assume that required air inlet conditions are 20°C 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°C , find the by-pass factor of the heating coil. (4)