

Code: 9A03402



B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016

THERMAL ENGINEERING - I

(Mechanical Engineering)

Max. Marks: 70

Time: 3 hours

Answer any FIVE questions All questions carry equal marks

- 1 (a) What is the use of air-standard cycle analysis of IC engine?
 - (b) What is the effect of time loss in mixing of fuel and air, and also in combustion in case of I.C engine?
- 2 (a) Differentiate battery ignition and magneto ignition system.
 - (b) The cubic capacity of a four stroke S.I engine is 250 cc and the stroke to bore diameter is 1.1. The clearance volume is 28 cc. Calculate the bore, stroke and compression ratio of the engine.
- 3 (a) What are knock limited parameters in case of combustion engines?
 - (b) What are homogeneous and heterogeneous mixtures? Explain in which engines these mixtures are used?
- 4 (a) What is the effect of A/F ratio on power output of CI engine?
 - (b) How does combustion take place in compression-ignition engines?
- 5 (a) What is Morse test? How is it carried out?
 - (b) A four stroke four cylinder diesel engine running at 800 rpm produces 500 kW of brake power. The cylinder dimensions are 40 cm bore and 30 cm stroke. Fuel consumption rate is 2 kg/min while air fuel ratio is 12. The average indicated mean effective pressure is 0.9 MPa. Determine indicated power, mechanical efficiency, brake thermal efficiency and volumetric efficiency of engine. The calorific value of fuel is 43 MJ/kg. The ambient conditions are 1 bar and 27°C.
- 6 (a) How compressors are classified based on its working principle, action of air, method of cooling and number of cylinders.
 - (b) A single stage double acting compressor runs at 300 rpm compresses air up to a delivery pressure of 7 bar. The condition of air at atmosphere is 1.013 bar, 27°C. The same at the end of suction stroke is 0.98 bar 40°C. Take C = 0.04, n = 1.3 and L/D = 1.3. Find the volumetric efficiency, indicated power, isothermal efficiency and cylinder dimensions.
- 7 (a) Explain the working of Lysholm compressor with the help of neat sketch.
 - (b) A centrifugal compressor delivers free air of 18 kg/min. Air is sucked at static states of 1 bar, 27°C with inlet velocity of 50 m/s. The total head pressure ratio is 4 and isentropic efficiency of compressor is 0.75. The mechanical efficiency of motor attached is 0.90. Determine total temperature of air at exit to compressor and power required to drive compressor.
- 8 (a) Draw the inlet and outlet velocity diagrams of an axial compressor and derive expression of work done in one stage.
 - (b) An axial flow compressor with an overall efficiency of 90% draws air at 20°C compresses air in to pressure ratio of 3.5:1 and the mean blade speed and flow velocity throughout the compressor may be assumed constant. Assuming 50% reaction blading taking blade velocity as 180 m/s and work input factor as 0.82, calculate: (i) Flow velocity. (ii) Number of stages.

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