

534

B. Tech. EXAMINATION, 2021

(Fifth Semester)

(Old Scheme) (Re-appear Only)

(ME)

ME307

INTERNAL COMBUSTION ENGINE AND GAS TURBINES

Time : 2½ Hours]

[Maximum Marks : 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. An air standard cycle consists of the following processes :
Isentropic compression from 15°C, 1.01 bar through a compression ratio of 5; heat addition at constant volume of 2600 kJ/kg; isentropic expansion to the initial volume; heat rejection at constant volume.
Sketch the cycle on P-V and T-S diagrams and calculate its ideal efficiency, mean effective pressure and peak pressure.
2. The fuel consumption of a petrol engine with a simple carburettor is 5 kg/h of petrol with an air fuel ratio of 14. The tip of the fuel jet is 6.0 mm above the fuel level in float chamber and the fuel jet area is 1.85 mm². Assume the coefficient of discharge of fuel orifice and venture throat as 0.8. Determine the throat diameter of venture. Assume density of air is 1.29 kg/m³ and density of petrol is 750 kg/m³.

3. Bring out clearly the process of combustion in S.I. engines and also explain the various stages of combustion.
4. Highlight the significance of viscosity index. How is it estimated ? Also explain the SAE rating of lubricants.
5. A four-stroke four cylinder engine (bore = 90 mm; stroke = 140 mm) develops 30 kW at 1600 rpm while running with 23 per cent rich mixture (Stoichiometric air fuel ratio 15). The volume of air in cylinder when measured at 17°C and 1.01 bar is 75% of the swept volume. Calorific value of fuel = 42000 kJ/kg. If the mechanical efficiency is 85%, determine :
 - (i) Indicated thermal efficiency
 - (ii) Indicated mean effective pressure.
6. Explain, how the HC, CO, NO_x emissions are controlled in MPFI engines ?
7. With the help of neat sketch discuss the construction working of Axial flow compressor.
8. Derive the relation for mean effective pressure for Brayton cycle.