

**BT-5/D-21****45034****IC ENGINE AND GAS TURBINES****Paper-ME-301E**

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Discuss the basic difference in the working of a 4-stroke and 2-stroke engine. 10
- (b) State the assumptions made in the analysis of an air standard cycle. What are the advantages of such an analysis? 10
2. (a) Differentiate between Otto and Diesel cycles. 10
- (b) Determine the thermal efficiency, mep and maximum pressure for a diesel cycle having a compression ratio 20. At the start of compression  $P = 100$  KPa,  $T = 300$  K. The heat added is 2000 kJ/kg air. 10

**UNIT-II**

3. (a) Explain various factors which affect the process of Carburetion. 10
- (b) List the limitations of the simple carburetor and explain the modification needed to meet the air-fuel ratio required for the engine running under different conditions. 10
4. (a) Describe the factors on which affect the ignition timing. What is meant by preignition? How pre-ignition leads to knocking and vice-versa. 10
- (b) Discuss the requirements of good combustion chamber of SI engines. 10

### UNIT-III

5. (a) Illustrate the differences between wet sump and dry sump lubrication system with neat sketches. 10
- (b) List important properties desired in a good lubricant for automobiles. 10
6. A four stroke six-cylinder gasoline engine has a bore of 80 mm and a stroke of 100 mm. During a test, it develops torque of 75 N-m when running at 2000 rpm. If the clearance volume of each cylinder is 60 cc and relative efficiency with respect to brake thermal efficiency is 0.55, the heating value of fuel is 40 MJ/kg, determine the bsfc and bmep. 20

### UNIT-IV

7. Discuss the following emission control techniques used in automobiles. 20
- (a) Direct Air injection.
- (b) After burners.
- (c) Exhaust manifold reactors.
- (d) Catalytic convertor systems.
8. A gas turbine cycle takes in air at 25°C and atmospheric pressure. The compression ratio is 4. The compressor efficiency is 75 percent. The inlet temperature to turbine is limited to 750°C. What turbine efficiency would give overall cycle efficiency zero percent. 20

