6. (a) Discuss the advantages and disadvantages of using LPG in SI Engine. 4

   (b) Explain with neat sketches the different methods of supercharging. Discuss the effects of supercharging on:
   (i) Power output
   (ii) Mechanical efficiency, and
   (iii) Fuel consumption 10

7. (a) With the help of p-θ diagram explain the stages of combustion in SI engine. 8

   (b) What are the factors tending to reduce knock in SI and CI engine? 6

8. (a) Explain with a neat sketch the working of a simple carburettor. 7

   (b) Derive the expression of fuel air ratio for a simple carburettor. 7

9. In an open gas turbine plant the pressure ratio through which air at 288 K is compressed is 14. The same air is then heated to a maximum temperature of 1300°C first in a heat exchanger which is 75% Effective and then in the combustion chamber. The heated air is then expanded in two stages such that the expansion work is maximum. The air is reheated to 1300°C after the first stage. The Compressor and Turbine efficiencies may be assumed to be 85% and 86% respectively. Determine:
(a) net power, (b) cycle efficiency, and (c) work ratio.

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Code : 021722

B.Tech.7th Semester Special Examination, 2016
Internal Combustion Engine and Gas Turbine

Time : 3 hours   Full Marks : 70

Instructions :

(i) There are **Nine** questions in this paper.

(ii) Attempt **Five** questions in all.

(iii) **Questions No.1 is Compulsory.**

(iv) The marks are indicated in the right hand margin.

1. Answer any SEVEN by writing TRUE or FALSE: 2×7=14

   (a) For a heat engine working on air standard Diesel cycle the efficiency will decrease as cut off is increased.

   (b) For the same compression ratio Diesel cycle is more efficient than Otto cycle.

   (c) The two reference fuels used for cetane rating are cetane and α-methyl naphthalene.

   (d) In a carburettor a choke value restricts the air supply to make the gas richer with fuel.

   (e) Pistons of diesel engines are usually cooled by water.

P.T.O.

(f) Mixing of fuel and air take place in engine cylinder in case of diesel engine.

(g) Knock in the SI engine can be reduced by supercharging.

(h) The tendency of knocking in CI engine is reduced by injection of fuel just before TDC.

(i) The Morse test is used to determine the indicated power of multicylinder SI engine.

(j) In a variable speed SI engine the maximum torque occurs at the maximum speed.

2. (a) How do you classify the Internal Combustion Engines? 4

   (b) Distinguish between the following: 10

      (i) SI Engine and CI Engine

      (ii) 2 Stroke Engine and 4 Stroke engine

3. (a) State the assumptions made in the analysis of air standard cycles. 4

   (b) With the help of p-V and T-S diagram compare the thermal efficiency of Otto, Dual and Diesel cycle on the following bases: 10

(i) same compression ratio and heat supply, and

(ii) same maximum pressure and heat supply

4. An I C Engine working on air standard Dual cycle has compression ratio 15, and the compression begins at 1 bar, 300 K. The maximum pressure is limited to 60 bar. The heat transferred to air at constant volume is twice that at constant pressure. Determine: 14

   (a) the pressure and temperature at the cardinal points of the cycle.

   (b) the cycle efficiency, and

   (c) the mean effective pressure of the cycle.

5. A four cylinder 4 stroke SI engine has a bore of 60 mm and a stroke of 85mm. It runs at 3000 rpm and is tested at this speed against a brake which has a torque arm of 0.35 m. The net brake load is 160 N and the fuel consumption is 6.6 l/hr. The Sp. Gravity of the fuel is 0.78 and it has a LCV of 44000 kJ/kg. A Morse test is carried out and the cylinders are cut out in the order 1,2,3,4 with the corresponding brake loads of 114,110,112 and 116 N respectively. Determine:

   (a) the bp, (b) the bmep, (c) the brake thermal efficiency, (d) the bsfc, (e) the ip, (f) the mechanical efficiency, and (g) the imep. 14