PVP 14

Code: ME4T3

II B.Tech - II Semester – Regular Examinations – May 2016

IC ENGINES AND GAS TURBINES
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1. a) Define the time loss factor.
   b) What is the cubic capacity of the engine?
   c) Define 'Scavenging'.
   d) What is the transposition rate in the flame front propagation?
   e) What is pre-ignition?
   f) What are the primary reference fuels to rate the CI engine fuels?
   g) List at least four methods to find frictional power.
   h) Define Indicated mean effective pressure.
   i) What are the desired properties of any alternate fuel for SI engines?
   j) What is open cycle gas turbine power plant ?
   k) Draw the T-S diagram for Jet engine.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) What is the difference between air standard cycle approximation, fuel-air cycle approximation and real cycle performance? 8 M

   b) What type engine is used for the two wheeler (Bajaj Pulsur)? Explain its working in detail. 8 M

3. a) Describe the different phases of combustion phenomenon in SI engines with suitable sketches. 12 M

   b) CI engines will accept the lean mixtures. Justify the statement. 4 M

4. a) What are the desirable properties for the SI engine fuel? If an alternative fuel with high octane number is used, what will be its effect on combustion? 5 M

   b) Find the engine dimensions of a 2-cylinder, 2-stroke I.C. engine from the following data:
   Engine speed= 4000 rpm,
   Volume efficiency = 0.77,
   Mechanical efficiency = 0.75,
   Fuel consumption = 10 Lit/hr S = 0.73,
   Air fuel ratio = 18:1,

Piston speed = 100 m/s,
Indicated mean effective pressure = 5bar.
Find also brake power. Take R of gas mixture as
281 J/Kg k at S.T.P. 11 M

5. A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610^0C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Air enters the compressor at 15^0C at the rate of 16kg/s. Calculate
i) work required for compression
ii) power developed by the turbine
iii) Net power output in kilowatts
Take C_p=1.005 kJ/kgk and γ=1.4 for the compression process, and take C_p=1.11 kJ/kgk and γ=1.333 for the expansion process. 16 M

6. a) Describe the working principle of the turbo jet engine. 8 M

b) What are the different thrust augmentation methods? Explain. 8 M