Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PCME 4302

Fifth Semester Back Examination – 2014

I.C. ENGINES AND GAS TURBINES

BRANCH : MECH

QUESTION CODE : L 235

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) Name the materials used for following components : (i) Cylinder, (ii) Piston, (iii) Connecting rod, (iv) Crank.

   (b) Draw the valve timing diagram for 4 stroke SI engine.

   (c) Differentiate between stroke volume and total volume.

   (d) Write down different types of nozzles used in injectors for CI engine.

   (e) Classify jet engines.

   (f) Mention the advantages of alternative fuels with two examples of alternative fuels used.

   (g) Differentiate between thermo-syphon type and forced type of water cooling system.

   (h) Differentiate between centrifugal type and axial type compressors used in gas turbine plant.

   (i) What are the assumptions used in ideal cycle analysis ?

   (j) Mention the different circuits used in Modern carburetors.

2. (a) Compare the two stroke SI and four stroke SI engine. 4

   (b) The initial condition of air in Otto cycle is 288 K and 1.05 bar. The air is compressed isentopically to pressure of 13 bar. Then heat is added at

constant volume till the pressure becomes 35 bar. Calculate (i) compression ration, (ii) air standard efficiency, (iii) mean effective pressure of the cycle. 6

3. (a) Explain different types of ignition methods used in SI engine. 5

   (b) Briefly explain the pumping loss and loss due to friction in actual cycles. 5

4. In a gas turbine plant, operating on Bryton cycle, maximum and minimum temperatures are 700°C and 35°C. The pressure ratio is 4. Calculate the specific work output, cycle efficiency and work ratio. Assume isentropic efficiencies of the compressor and turbine at 85 and 90 percent respectively. What is the heat rate in kJ/Kw-hr ? If the rating of the turbine is 1200 kW, what is the mass flow in kg/sec ? Neglect mass flow of fuel. Assume $c_p = 1.005$ kJ/kgK. 10

5. (a) What do you mean by supercharging ? Explain different methods of super-charging. 5

   (b) With neat sketch, explain any one type of jet engines used 5

6. (a) What is detonation ? Explain different factors used to control detonation. 5

   (b) With neat sketch, describe the stages of CI engine combustion. 5

7. (a) Briefly explain the performance characteristic curves of SI engines. 5

   (b) Differentiate between the open type and divided type combustion chambers. 5

8. Write short notes on any **two** : 5×2

   (a) CRDI

   (b) MPFI

   (c) Dual fuel engine.