B.Tech II Year II Semester (R13) Regular & Supplementary Examinations May/June 2016
THERMAL ENGINEERING – I
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
*****

1   Answer the following: (10 X 02 = 20 Marks)
   (a)   What are the two basic types of internal combustion engines?
   (b)   What is the function of governor in an internal combustion engine?
   (c)   Why do we feel the necessity of cooling in I.C. Engine?
   (d)   State the purpose of lubrication?
   (e)   What do you mean by pre-ignition?
   (f)   What is meant by ignition delay?
   (g)   What are the causes of knocking in C.I. Engines?
   (h)   What do you mean by 'octane number' and 'Cetane number' of fuels?
   (i)   What is a rotary compressor?
   (j)   What do you mean by 'surging' and 'chocking'?

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Why the internal combustion engines are widely used compare to external combustion engines.
   (b) Discuss the working of four stroke cycle petrol engine with help of neat sketches?
OR
3 (a) What are the different types of classifications of I.C. Engines? Explain briefly with suitable examples.
   (b) Explain with neat sketches the significance of valve timing diagram and port timing diagram.

UNIT – II

4 (a) Describe with a neat sketch the working principle of Mechanical fuel pump.
   (b) Explain briefly with neat sketch the battery ignition system?
OR
5 (a) Explain with neat sketch the working principle of pressure lubrication systems.
   (b) Describe the working of electronic ignition system with magnetic pick up.

UNIT – III

6 (a) What is diesel knock? How to minimize knocking in C.I. engine?
   (b) What are the types of combustion chambers used in C.I. engines and explain their role in generating turbulence.
OR
7 (a) Briefly explain the stage of combustion in S.I Engines elaborating the flame front propagation.
   (b) What are the factors that decide the smooth operation of a Diesel engine?

UNIT – IV

8 (a) List the different methods used for finding friction power and indicated power of an engine Explain in detail.

(b) A gas engine working on Otto cycle has piston diameter 24 cm and stroke length 50 cm. It works on the following conditions rpm = 210, Misfire per minute = 10, Mean effective pressure = 7.5 bar, Mechanical efficiency = 80%, Assuming the engine to be working on four stroke cycle principle.
Determine: (i) IP. (ii) BP. (iii) FP.

OR

9 (a) Following observations were recorded during a single cylinder oil engine bore 300 mm, stroke 450 mm, speed 300 rpm, IMPE 6 bar, net brake load 1.5 kN, brake drum diameter 1.8 meters, brake rope diameter 2 cm. Calculate the (i) Indicated power. (ii) Brake power. (iii) Mechanical efficiency.

(b) Enumerate the various engine efficiencies. Explain?

UNIT – V

10 Compare the merits and demerits of axial flow compressor and centrifugal compressor?
A single stage, double acting compressor has a free air delivery of 14 m^3/min. measured at 1.013 bar and 15^0C. The pressure and temperature in the cylinder during induction are 0.95 bar 32^0C. The delivery pressure is 7 bar and index of compression and expansion, n = 1.3. The clearance volume is 5% of the swept volume. Calculate: (i) Indicated power required. (ii) Volumetric efficiency.

OR

11 (a) Explain the terms slip factor and power input factor in centrifugal compressors?

(b) An axial flow compressor, with compression ratio as 4, draws air at 20^0 C delivers it at 197^0C. The main blade speed and flow velocity are constant throughout the compressor. Assume 50 % reaction blading and take the blade velocity as 180 m/s. Find the flow velocity and number of stages. Take work factor = 0.82, $\alpha = 12^0$, $\beta = 42^0$ and Cp = 1.005 kJ/kg K.

*****