

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

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) State the purpose of providing piston in IC engine.
 - (b) What do you mean by scavenging in IC engine?
 - (c) What is carburetion?
 - (d) State any four functions of lubrication.
 - (e) What is detonation?
 - (f) What is meant by diesel knock?
 - (g) Differentiate between brake power and indicated power of an IC engine.
 - (h) Differentiate between SFC and TFC in engine performance.
 - (i) What is the difference between perfect inter cooling and imperfect cooling.
 - (j) Draw the p-V diagram of a two stage reciprocating air compressor.

PART – B

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

UNIT – I

- 2 Describe the working of two stroke SI engine along with port timing diagram.

OR

- 3 Describe any five terminologies with suitable sketch involved in IC engine.

UNIT – II

- 4 What are the different types of cooling systems? Explain any two in detail.

OR

- 5 Mention the various methods of lubrication system and explain any two in detail.

UNIT – III

- 6 Explain with neat sketches normal and abnormal combustion in S.I engines.

OR

- 7 Define Ignition lag in CI engine. What are the factors effecting Ignition lag? Explain in CI engine.

UNIT – IV

- 8 (a) Describe the method of finding friction power using Morse test.
(b) An IC engine uses 6 kg of fuel having calorific value 44000 kJ/kg in one hour. The IP developed is 18 kW. The temperature of 11.5 kg of cooling water was found to rise through 25°C per minute. The temperature of 4.2 kg of exhaust gas with specific heat 1 kJ/kgK was found to rise through 220°C. Draw the heat balance sheet for the engine.

OR

- 9 (a) Establish the expression for brake power using rope brake and prony brake dynamometer.
(b) A rope brake has brake wheel diameter of 600 mm and the diameter of rope is 5 mm. The dead load on the brake is 210 N and spring balance reads 30 N. If the engine makes 450 rpm, find the brake power developed

Contd. in page 2

UNIT – V

- 10 A two stage single acting reciprocating compressor takes in air at the rate of $0.2 \text{ m}^3/\text{s}$. The intake pressure and temperature of air are 0.1 MPa and 16°C . The air is compressed to a final pressure of 0.7 MPa . The intermediate pressure is ideal and inter-cooling is perfect. The compression index in both the stages is 1.25 and the compressor runs at 600 rpm . Neglecting clearance, determine: (i) The intermediate pressure. (ii) The total volume of each cylinder. (iii) The power required to drive the compressor. (iv) The rate of heat rejection in the intercooler. Take $C_p = 1.005 \text{ kJ/kgK}$ and $R = 0.287 \text{ kJ/kgK}$.

OR

- 11 (a) Compare the Centrifugal and Axial Compressor.
(b) List the various types of rotary compressors and explain the working principles of Roots blower.

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