Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(AE) (2013 Onwards)   (Sem.–3)

INTERNAL COMBUSTION ENGINES

Subject Code : BTAE-303/401

M.Code : 72204

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

    a) Sketch p-v and T-s diagram for Otto cycle.

    b) Write the function of piston rings.

    c) Name the main steps involve in 4-stroke IC engine.

    d) Name two variables that affects the delay period.

    e) What is the use of inlet manifold heater?

    f) What do you understand by spark retardation?

    g) What is viscous coupling?

    h) What is supercharging?

    i) Name the various parts of a water pump with the help of a sketch.

    j) What is heat balance sheet?

SECTION-B

2. Calculate the percentage change in efficiency of air standard Otto cycle having a compression ratio of 7 for the following cases:

   a) The specific heat at constant volume increase by 2%.

   b) The specific heat at constant pressure increased by 2%. Assuming γ to be invariant.

3. Write different types of combustion chamber used in SI engine. Explain **any two** with neat sketches.

4. Explain the phenomenon of knock in CI engines and compare it with SI engine knock.

5. Why engine cooling is needed? Briefly explain with neat sketch splash lubrication system.

6. Explain the need of supercharging and with a neat sketch describe pulse converter turbocharging.

SECTION-C

7. a. Derive the efficiency of an air standard Otto cycle.

   b. Describe the working principle of an electronically controlled fuel injection system.

8. Discuss the effects of following factors on knocking tendency of an engine

   a) Compression ratio

   b) Spark timing

   c) Flame velocity

   d) Pressure and temperature of mixture at inlet

9. A 4-stroke 4- cylinder petrol engine develops 30 kw power at 1500 rpm. The average torque produced when each cylinder cut off is 130 Nm. The fuel used has calorific value 43.5 MJ/kg and BSFC is 0.40 kg/kwhr. Calculate :

   a) Mechanical efficiency

   b) Indicated thermal efficiency

   c) Brake thermal efficiency.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.