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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

Paper ID : [A3270]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION 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**I. Write briefly :**

- a) Draw the p-v and T-s diagram for Otto cycle.
- b) Why compression ratio of petrol engines is low while diesel engines have high compression ratio.
- c) Briefly explain stages of combustion in SI engines.
- d) Sketch and explain actual port timing diagram for 2-stroke engines.
- e) What are the limitations of a simple carburetor?
- f) Explain the effect of spark advancement on engine performance.
- g) What are the requirements of a diesel injection system?
- h) Explain wet sump method of lubrication.
- i) Explain the necessity of engine cooling.
- j) What do you understand by supercharging of SI engines?

SECTION-B

2. What is scavenging? Explain various types of scavenging.
3.
 - a) With the aid of a schematic diagram, explain the combustion process in a CI engine.
 - b) Explain the factors affecting the delay period in C.I. engines and summarize those.
4. What is ignition lag? Explain the effect of following engine variable on ignition lag-
 - a) Mixture ratio
 - b) Electrode gap
 - c) Initial temperature and pressure
5. What are the functions of lubrication? State the required properties of a lubricating oil.
6. Explain the thermosiphon cooling system.

SECTION-C

7. A perfect gas at 1 bar and 290 K undergoes ideal diesel cycle. The maximum pressure of the cycle is 50 bar. The volume at the beginning of compression is 1 m^3 and after constant pressure heating is 0.1 m^3 . Determine the temperature at all salient points of the cycle and also find out the efficiency of the cycle. Take $\gamma = 1.4$ for the gas.
8. What is turbo charging and how it is different from supercharging? Explain in brief the methods of turbo charging.
9. In a test on a single cylinder 4- stroke diesel engine with bore 400mm and stroke 450 mm, the following observations were made : Duration of test : 1 hr, Fuel consumption : 7.5 kg, C.V. of fuel : 44500 kJ/kg, Total Revolution : 12000/hr, Indicated mean effective pressure 3.75 bar, Net brake, load 1500 N, Brake drum diameter = 180 cm, Rope drum diameter = 3 cm, Jacket cooling water = 600 kg, Rise in cooling water Temp = 42°C , Total air consumption : 560 kg, Exhaust gas Temp = 300°C , Room Temp = 20°C , Specific Heat of exhaust gases = 1.01 kJ/kg-K . Determine
 - a) Mechanical η
 - b) Indicated and brake thermal η
 - c) Draw up heat balance sheet on minute basis