

(Compulsory Question)

9. (i) What is meant by TDC and BDC ? In a suitable sketch, mark the two dead centres.
- (ii) What is meant by abnormal combustion ?
- (iii) What are the requirements of a good combustion chamber of a CI engine ?
- (iv) What are the essential parts of a modern carburettor ?
- (v) Enumerate various components of an electronic injection system.
- (vi) State the function of ECU in diesel engine.
- (vii) What are the disadvantages of overcooling an internal combustion engine ?
- (viii) The bore and stroke of a water-cooled, vertical, single-cylinder, four-stroke diesel engine are 80 mm and 110 mm respectively and the torque is 23.5 Nm. Calculate the brake mean effective pressure of the engine.
- (ix) What is the difference between OBDI and OBDII ?
- (x) What are the disadvantages of using natural gas as alternate fuels ?  $10 \times 2 = 20$

Roll No. ....

Total Pages : 04

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**B. Tech. EXAMINATION, 2022**

Semester IV (CBCS)

I.C. ENGINES (ME, AE)

ME-403

*Time : 3 Hours*

*Maximum Marks : 60*

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Attempt *Five* questions in all, selecting *one* question from each Section A, B, C and D. Q. No. 9 is compulsory. Draw neat and comprehensive sketches wherever necessary to clearly illustrate your answer.

**Section A**

1. (a) Distinguish between four-stroke and two-stroke IC engines. 5
- (b) What is the difference between air-standard cycle and fuel-air cycle analysis ? Explain the significance of the fuel-air cycle. 5

2. (a) Describe the different stages of combustion in a CI engine. 5
- (b) What are the various types of combustion chambers used in SI engines ? Explain them briefly. 5

### Section B

3. (a) Describe down-draught, up-draught and horizontal-draught carburettors with the help of diagram. 5
- (b) Describe the principle of a timed injection systems. 5
4. (a) What are turbochargers ? Discuss its types. 5
- (b) Explain different types of nozzles. 5

### Section C

5. (a) Describe the dry-sump lubrication system with the help of a diagram. 5
- (b) What are the advantages and disadvantages of an air-cooling system ? 5
6. The following results were obtained in a test on a gas engine :

Gas used =  $0.16 \text{ m}^3/\text{min}$  at NTP  
 Calorific value of gas at NTP =  $14 \text{ MJ/m}^3$   
 Density of gas at NTP =  $0.65 \text{ kg/m}^3$   
 Air used =  $1.50 \text{ kg/min}$   
 Specific heat of exhaust gas =  $1.0 \text{ kJ/kg K}$   
 Temperature of exhaust gas =  $400^\circ\text{C}$   
 Room temperature =  $20^\circ\text{C}$   
 Cooling water per minute =  $6 \text{ kg}$   
 Specific heat of water =  $4.18 \text{ kJ/kg K}$   
 Rise in temp. of cooling water =  $30^\circ\text{C}$   
 $i_p = 12.5 \text{ kW}$   
 $b_p = 10.5 \text{ kW}$   
 Draw a heat balance sheet for the test on per hour basis in kJ. 10

### Section D

7. (a) Explain the working of catalytic convertor. 5
- (b) Write a short note on "Emission Measurement Techniques". 5
8. (a) What are the advantages and disadvantages of using hydrogen in SI engine ? 5
- (b) What are the merits and demerits of using alcohol as an alternate fuel for IC engines ? 5