Total No. of printed pages = 3

ME 1818 PE 33

17/6/23

Roll No. of candidate

2023

B.Tech. 8th Semester End-Term Examination

Mechanical Engineering

INTERNAL COMBUSTION ENGINES

(New Regulations (w.e.f. 2017-18) & New Syllabus (w.e.f. 2018-19))

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *four* from the rest.

1. Answer the following questions :   (10 × 1 = 10)

    (i)   State the significance of stoichiometric air-fuel mixture?

    (ii)   What is equivalence ratio?

    (iii) What are the components required in the fuel injection system?

    (iv)   What are the different types air—fuel mixtures?

    (v)   What are the different ranges of throttle operation?

    (vi)   What are the various factors that affect the flame speed?

    (vii) What is indicator diagram?

    (viii) What is flame front?

    (ix)   What is the self ignition temperature?

    (x)   What is ignition lag in SI Engine?

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2. (a) Explain by means of suitable graphs the effect of specific heat loss and dissociation on maximum temperature and brake power.

   (b) Define equivalence ratio and stoichiometric ratio. How the power and efficiency of the SI engine vary with air-fuel ratio for different load and speed conditions? (7+8=15)

3. (a) With the help of a neat sketch explain the working of a common rail injection system.

   (b) A single jet simple carburetor is to supply 6 kg/mm of air and 0.44 kg/min of petrol of specific gravity 0.74. The air is initially at 1 bar and 27°C. Assuming isentropic co-efficient of 1.35 for air, determine (i) the diameter of the venturi, if the air speed is 90 m/s and the velocity co-efficient of the venturi is 0.85 (ii) the diameter of the jet, if the pressure drop at the jet is 0.8 times the pressure drop at the venturi and the co-efficient of discharge for the jet is 0.66. (5+10=15)

4. (a) Explain the various stages of combustion in CI engine.

   (b) Give a comparative statement of various characteristics that reduces knocking in S.I and C.I. engine. (7+8 = 15)

5. (a) Explain magneto ignition system with help of a neat sketch.

   (b) A four stroke petrol engine delivers 35.75 kW with a mechanical efficiency of 80%, the fuel consumption of the engine is 0.4 kg per brake power hour, and the A/F ratio is 14:1. The heating value of the fuel is 41870 kJ/kg. Find: (i) i.p, (ii) f.p., (iii) brake thermal efficiency, (iv) fuel consumption/hour, (v) air consumption/hour. (7+8=15)

6. (a) Give a brief account of emissions from SI and CI engines.

   (b) A four stroke four cylinder diesel engine running at 300 rpm produces 250 kW of brake power. The cylinder dimensions are 30 cm bore and 25 cm stroke. Fuel consumption rate is I kg/min while air fuel ratio is 10. The average indicated mean effective pressure is 0.8 MPa. Determine indicated power, mechanical efficiency, and brake thermal efficiency of engine. The calorific value of fuel is 43 MJ/kg. The ambient conditions are 1.013 bar, 27°C. (5+10=15)

7. (a) What are the effects of turbo charging on CI engines?

(b) A eight cylinder, four stroke diesel engine develops 150 kW at 3000 rpm. Its brake specific fuel consumption is 200 gm/kW h. Calculate the quantity of fuel to be injected per cycle per cylinder. Specific gravity of fuel may be taken as 0.85.
(7+8 = 15)

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