Total No. of Questions : 8]

SEAT No. :

PF4826

[Total No. of Pages : 3

[6625]-125
S.E. (Automobile & Mechanical)
APPLIED THERMODYNAMICS
(2019 Pattern) (Semester - IV) (202048)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***

Q1) a) Draw and Explain the Stages of Combustion in SI engine with the help of pressure-crank angle (P-θ) diagram. **[9]**

b) Explain DMPFI & LMPFI with neat sketch? **[8]**

OR

Q2) a) Draw and Explain the Stages of Combustion in CI engine with the help of pressure-crank angle (P-θ) diagram. **[9]**

b) State and explain any four parameter that reduce knocking tendency in CI engine. **[8]**

Q3) a) The following readings were taken during the test of a single cylinder four stroke oil engine: **[10]**

Cylinder diameter = 250 mm, Stroke length = 400 mm, i.m.e.p. = 6.5 bar, Engine speed = 250 r.p.m., Net load on the brake = 1080 N, Effective diameter of the brake = 1.5 m; Fuel used per hour = 10 kg, Calorific value of fuel = 44300 kJ/kg.

Calculate:

i) Indicated power

ii) Brake power

iii) Mechanical efficiency

iv) Indicated thermal efficiency

P.T.O.

b) Explain **[8]**

i) Absorption Dynamometer

ii) Transmission Dynamometer

Write working of Prony Brake type of dynamometer with the help of neat sketch

OR

Q4) a) Explain the Indian driving cycle and the European driving cycle with neat graphs. **[9]**

b) Explain with the help of a diagram need of Chemiluminescent analyzer. **[9]**

Q5) a) Explain with neat sketch pump assisted thermo-syphon water-cooling systems. State any six differences between air-cooling and water-cooling system. **[9]**

b) What are the functions of lubrication system? Explain pressurized lubrication system with neat sketch? **[8]**

OR

Q6) a) Explain with neat sketch working of magneto ignition system? State any six differences between battery and magneto ignition system? **[9]**

b) Write a short note on; **[8]**

i) Ethanol

ii) LPG

Q7) a) Derive an expression for intermediate pressure for two stage compression with perfect intercooling. Write the Advantages of Multi-stage reciprocating compressor? **[8]**

b) A single stage reciprocating compressor takes $1m^3$ of air of per minute at 1.013 bar at 15°C and delivers it at 7 bar according to law $PV^{1.35}$ = constant. Calculate power required for compression Neglecting clearance. Calculate the following: **[10]**

i) Mass of the air delivered / min

ii) Delivery temperature

iii) Indicated power

Take individual gas constant R = 287 J/Kg K

OR

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Q8) a) Explain Roots Blower and Vane type compressor with neat sketch. **[8]**

b) A two-stage reciprocating air compressor takes in air at 1 bar and 27°C air is delivered at 10 bar. The intermediate pressure is ideal and intercooling is perfect. The law for compression is $PV^{1.35} = C$ the rate of discharge is 0.1 kg/sec. **[10]**

Find:

i) Power required to drive the compressor.

ii) Power required to compress the air in single compression.

iii) Isothermal efficiency for multistage.

iv) Heat rejected in intercooler.

Take: R = 0.287 kJ/kg.K and Cp = 1 kJ/kg.K

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