

Seat
No.

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मठ - 037

Internal Combustion Engine (1050)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** subquestions from each unit.
5. Use of steam table, Mollier charts & nonprogrammable calculator is allowed.
6. Draw neat sketches wherever necessary.
7. Assume suitable data if necessary.

UNIT - I

1. a) Derive an expression for the efficiency of Diesel cycle on the PV & TS diagram. 10
b) In an otto engine, pressure and temperature at the beginning of compression are 1 bar and 37°C respectively. Calculate the theoretical thermal efficiency of this cycle if the pressure at the end of the adiabatic compression is 15 bar Peak temperature during the cycle is 2000K calculate,
i) the heat supplied per kg of air.
ii) the work done per kg of air and
iii) the pressure at the end of adiabatic expansion.
Take $C_v = 0.717 \text{ kJ/kgk}$ $\gamma = 1.4$. 10
c) Obtain an expression for Brayton cycle with P-V and T-S diagrams. 10

UNIT - II

2. a) With neat sketch explain the working of solex-carburettor. 10
b) Write short note on with neat sketch. 10
i) Fuel injector. ii) Types of Nozzles.
c) A simple carburettor has the venturi of throat diameter of 8cm and the coefficient of discharge is 0.94. The fuel orifice has the diameter of 0.5cm and it's coefficient of discharge of 0.7. Find the air-fuel ratio if the pressure drop amounts to 0.14 bar when.
i) Nozzle lip is neglected.
ii) Nozzles lip is taken into account and it is equal to 0.5cm.
Assume density of fuel as 780 kg/m^3 approach factor as 1 and density of air as 1.293 kg/m^3 . 10

UNIT - III

3. a) What are the requirements of ignition system? Explain battery ignition system with neat sketch. 10
- b) Why governing of I.C. engine is required? Explain with neat sketch Hit and Miss governing as applied gas engine. 10
- c) i) Discuss important properties of lubricant. 10
 ii) Discuss the Dry sump system of lubrication for IC engine. 10

UNIT - IV

4. a) Explain the various engine variables which affect the ignition lag. 10
- b) List the different types of combustion chamber? Discuss with neat sketch T-Head combustion chamber. 10
- c) Write short note on : 10
 i) Dopes for SI engine. ii) Air swirl.

UNIT - V

5. a) Explain with neat sketch Exhaust Gas Recirculation method. 10
- b) A six-cylinder gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80mm and the stroke 100mm. The clearance volume per cylinder is 70CC. At a speed of 4000 rpm the fuel consumption is 20 kg/h and the torque developed is 150Nm calculate. 10
 i) the brake power.
 ii) the brake mean effective pressure.
 iii) Brake thermal efficiency if the calorific value of the fuel is 43000 kJ/kg and
 iv) the relative efficiency on a brake power basis assuming the engine works on the constant volume cycle $\gamma = 1.4$ for air.
- c) Explain the internationally accepted methods of measuring the following invisible emission. 10
 i) Aldehydes.
 ii) Unburned hydrocarbon.
 iii) Carbon monoxides.
 iv) Oxides of Nitrogen.
