24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define : Piston stroke and scavenging.

(b) List four moving parts of I.C. Engine.

(c) State the function of Piston ring & flywheel.

(d) List four circuits used in solex carburettor.

(e) Name the different types of silencers/mufflers used in automobiles.

(f) State the properties of coolant used in cooling system of engine.

(g) Define :

(i) Mechanical efficiency

(ii) Brake thermal efficiency

2. Attempt any THREE of the following : **12**

(a) Distinguish between 2 stroke & 4 stroke cycle engine on the basis of :

weight, mechanical efficiency, power output and its applications.

(b) Explain the valve cooling with neat sketch in brief.

(c) Interpret necessity of air filter and fuel filter for an automobile engine.

(d) Elaborate the working of wet sump (pressure) lubrication system.

3. Attempt any THREE of the following : **12**

(a) Classify the I.C. engine on basis of :

(i) Cycle of operation

(ii) Method of charging

(iii) Cooling methods

(iv) Camshaft layout

(b) Sketch the piston and connecting rod assembly and label the following parts :

(i) Piston ring

(ii) Big end bearing

(iii) Piston skirt

(iv) Gudgeon pin

(c) Illustrate working of battery ignition system with sketch.

(d) State the need of firing order in multi-cylinder engine. State firing order for 3 and 4 cylinder engine.

4. Attempt any THREE of the following : **12**

(a) Select IC engine for heavy motor vehicle (commercial) with justification.

(b) Choose material and manufacturing processes used for cylinder block with justification.

(c) Compare battery and magneto ignition system on the basis of :

(i) Starting of engine

(ii) Efficiency

(iii) Suitability

(iv) Space and applications

(d) State the need of cooling system and compare various cooling system of engine.

(e) The following readings were noted during a trial on single cylinder two stroke engine :

Engine is motored by an electric motor and frictional power loss recorded on wattmeter is 1.25 kW.

Net Brake load = 225 N

Diameter of brake wheel = 100 cm

Engine speed = 500 rpm

Fuel consumption = 2.04 kg/hr

Calorific value of fuel = 42000 kJ/kg

Calculate mechanical efficiency and brake thermal efficiency.

5. Attempt any TWO of the following : **12**

(a) Elaborate the valve timing diagram for 4 stroke S.I. engine with sketch.

(b) State different types of fuel injection systems and explain any one in details.

(c) Construct the layout of Common Rail Direct Injection (CRDI) system for diesel engine. State any 02 merits of the same.

6. Attempt any TWO of the following : **12**

(a) List the dynamometers used in engine testing. Explain eddy current dynamometer with sketch.

(b) Select cooling system for high speed light motor vehicle with justification.

(c) The following observations are made during a trial on an engine :

(i) RPM = 1750

(ii) Brake torque = 327.5 Nm

(iii) Fuel used = 15 kg/hr

(iv) Air supplied = 4.75 kg/min

(v) CV of fuel = 42 MJ/kg

(vi) Room temp. = 20.8 °C

(vii) Quantity of cooling water = 16 kg/min

(viii) Outlet temp. of cooling water = 65.8 °C

(ix) Exhaust gas temp. = 400 °C

Take Cpw = 4.2 kJ/kg °K

Cpg = 1.25 kJ/kg °K

Draw heat balance sheet on kW basis and percentage basis.