

17408

14115

3 Hours / 100 Marks

Seat No.

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- Instructions :** (1) All Questions are *compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.

Marks

1. (A) Attempt any **SIX** of the following :

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- (a) What is meant by scavenging ?
- (b) Give two applications of I.C. engine.
- (c) State functions of – (i) Piston rings (ii) Fly wheel.
- (d) What is Air-fuel ratio ? Define chemically correct A/F ratio.
- (e) What is firing order ? State firing order for 4 cylinder engine.
- (f) Why additives are used in coolant ? Give one example of coolant additive.
- (g) State the purpose of thermostat valve.
- (h) Define : (i) Brake power (ii) Brake thermal efficiency.
- (i) State functions of exhaust manifold.

(B) Attempt any **TWO** of the following :

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- (a) Compare 4-stroke and 2-stroke engine (four points).
- (b) With neat sketch describe working principle of 4-stroke petrol engine.
- (c) Give four specifications of an engine of heavy motor vehicle.



P.T.O.

2. Attempt any FOUR of the following :**16**

- (a) Draw a neat sketch of piston and connecting rod assembly and label the parts.
- (b) State material and manufacturing method for following engine components :
 - (i) Cylinder Head
 - (ii) Piston
 - (iii) Connecting rod
 - (iv) Crankshaft
- (c) Explain how camshaft speed is related to crankshaft speed.
- (d) Classify I.C. engines on the basis of :
 - (i) Operating cycle
 - (ii) Type of Fuel used
 - (iii) Method of ignition
 - (iv) Arrangement of cylinders
- (e) Draw a layout of pump feed fuel supply system for petrol engine and describe it.
- (f) Describe with sketch working of simple carburettor.

3. Attempt any FOUR of the following :**16**

- (a) Describe construction and working of overhead valve operating mechanism.
- (b) Distinguish between dry and wet liners.
- (c) Draw and describe port timing diagram for 2-stroke S.I. engine.
- (d) Describe acceleration pump circuit used in solex carburettor.
- (e) State four requirements of fuel injection system.
- (f) Sketch types of fuel injector nozzles.

4. Attempt any FOUR of the following :**16**

- (a) Sketch 'Battery Ignition System' and describe its working.
- (b) List components of exhaust system and describe its working.
- (c) Explain the need of cooling system. Write two limitations of cooling system.
- (d) Sketch the layout of liquid cooling system and write function of four major components.
- (e) State four essential properties of lubricating oil.
- (f) Explain what is meant by positive crankcase ventilation.

5. Attempt any FOUR of the following :**16**

- (a) Draw a labelled sketch of radiator and describe its construction.
- (b) Draw a layout of pressure lubrication system and describe its working.
- (c) State functions of –
 - (i) Oil pump
 - (ii) Oil filter
 - (iii) Pressure regulator
 - (iv) Oil pressure gauge
- (d) Write I.C. engine nomenclature.
- (e) Describe working principle of eddy current dynamometer.
- (f) Why actual valve timing diagram is different than theoretical valve timing diagram ? Explain.

6. Attempt any TWO of the following :**16**

- (a) What is meant by engine testing ? Describe the method of calculate friction power using morse test.
- (b) In a test on a 2-stroke single cylinder diesel engine, following observations were made :

Bore – 75 mm, Stroke – 90 mm, Engine speed = 1200 rpm, Mean effective pressure = 7.5 bar, Mean brake diameter = 1 m, Net brake load = 500 N, Fuel consumption = 4.08 kg/hr, Calorific value of diesel = 42000 kJ/kg

Calculate –

- (i) Mechanical efficiency
- (ii) Brake thermal efficiency
- (c) A trial is conducted on a 4-stroke 4 cylinder petrol engine which develops a brake power of 14.58 kW, following observations are noted –
- (i) Power required to motor the engine 5 kW
- (ii) Cooling water supplied = 10 kg/min.
- (iii) Sp. Heat of water = 4.187 kJ/kgK.
- (iv) Fuel consumption = 2 kg/hr.
- (v) Temperature rise of cooling water = 40 °C

If calorific value of petrol is 45000 kJ/kg, draw heat balance sheet for the test on kJ/min basis.
