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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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (A) Attempt any **THREE** of the following : **12**

- (a) Compare S.I. and C.I. engine on the basis of
(i) Thermodynamic cycle
(ii) Compression ratio
(iii) Power output per unit weight
(iv) Fuel consumption
(b) List four drawbacks of carbureted S.I. engine.
(c) State four advantages of using CRDI system.
(d) How variable geometry turbo-charging is beneficial over conventional turbo-charging ? (2 points)

(B) Attempt any **ONE** of the following : **6**

- (a) Describe the working of electronic fuel injector with the help of suitable sketch.
(b) Compare detonation and diesel knock phenomenon (4 points). Give graphical presentation.

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

- (a) List four types of combustion chambers used in C.I. engine. Draw a neat sketch of one type and label it.

P.T.O.

17523

[2]

- (b) State four methods of petrol injection. Describe any one.
- (c) Describe construction and function of glow plug. State one application.
- (d) State effect of four engine variables on ignition lag.
- (e) Describe the effect of air-fuel ratio on flame speed.
- (f) Explain the term 'Ignition Limits'. State the ignition limits for S.I. engine.

3. Attempt any FOUR of the following :

16

- (a) Distinguish between TBI and PFI systems. (4 points)
- (b) Illustrate with example, fuel injection as an output control function of ECM.
- (c) Describe the working of pressure regulator in PFI system with the help of schematic diagram.
- (d) Draw a neat labelled block diagram of electronic control system in CRDI system.
- (e) Describe operation of CRDI system.
- (f) Draw a neat labelled circuit diagram of glow plug.

4. (A) Attempt any THREE of the following :

12

- (a) State four desirable properties of S.I. engine fuel.
- (b) Draw a labelled block diagram of series type Hybrid Vehicle. State two advantages.
- (c) LPG is used as a fuel for petrol engine. Justify your answer.
- (d) Describe the concept of variable valve timing.

(B) Attempt any ONE of the following :

6

- (a) With the help of neat sketch, describe the working of high pressure pump used in CRDI system.
- (b) Compare LPG and CNG as I.C. engine fuels on the basis of
 - (i) fuel tank size
 - (ii) storage pressure
 - (iii) cost
 - (iv) octane rating
 - (v) availability
 - (vi) safety

- 5. Attempt any TWO of the following : 16**
- (a) (i) Briefly describe four effects of detonation. 4
 - (a) (ii) State four methods of controlling detonation. 4
 - (b) State the location and function of two sensors and two actuators used in MPFI engine.
 - (c) (i) How does catalytic converter work in oxidation and reduction of exhaust gas ? 2
 - (c) (ii) State chemical reactions. 2
 - (c) (iii) Why oxygen sensors are fitted at inlet and outlet of catalytic converter ? 4
- 6. Attempt any FOUR of the following : 16**
- (a) Describe the concept of Gasoline direct injection.
 - (b) State four methods to improve fuel economy of an engine.
 - (c) What is diesel smoke ? State two methods to control diesel smoke.
 - (d) Describe the working of Evaporative emission control system.
 - (e) Describe two engine modifications to be done to reduce S.I. engine emission.
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