2013
MODERN VEHICLE TECHNOLOGY

Time Allotted : 3 Hours | *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Toyota Hybrid vehicles
   a) provide reduced CO_2 emissions
   b) equipped with Petrol engine and Diesel engine
   c) use a Power split device with a Planetary Gear in their transmission
   d) work on Sterling Heat Cycle.

ii) Keeping in view of cleaner environment and to cut down vehicular noise, passenger cars use
   a) stratified charge engine
   b) battery powered vehicle
   c) Electric propulsion with cable
   d) hydrogen fueled vehicle
   e) hybrid vehicle.

iii) Energy Density of Hydrogen Fuel as liquid is
   a) double that of Petrol
   b) half that of Petrol
   c) one fourth that of Petrol
   d) almost same that of Petrol.

iv) The Indian Car model in which Stratified engine is used is
   a) Esteem b) Ford Ikon
   c) Santro d) Honda City.

v) Common Rail Fuel Injection system is used in
   a) MPFI engine b) Diesel engine
   c) Hydrogen engine d) Solar Power engine.

vi) Lambda sensor is used to monitor
   a) Nitrogen b) Oxygen
   c) CO_2 d) CO.

vii) % slip rate means the
   a) wheel is rolling freely
   b) wheel is fully locked
   c) wheel is partially locked.

viii) Crankshaft position sensor is mounted on
   a) oil pan with specified air gap between the sensor core end and crankshaft timing belt pulley tooth
   b) crankshaft
   c) transmission gear box
   d) none of these.

ix) The unit injector is installed in the diesel engine directly through

a) cylinder block

b) cylinder head inlet manifold

c) cylinder head

d) fuel injection pump.

x) Post-injection in CI engine occurred

a) before the main fuel injection

b) after the main fuel injection

c) both of these

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is Pilot Injection ? Why is it used ?

3. What is Electronic Ignition ? How does it work ?

4. What is unit injector ? How does the Electronic Unit Injector work ?

5. State the advantages of 42 Volt system used in Automobile.

6. What is DTS-Si system ? What are the benefits of this system ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is a Hybrid Vehicle ? Write down the needs of Hybrid Vehicle and name various Indian models operating now. 6

b) Explain with sketch various methods of combining IC Engine with Electric Motor to drive a passenger vehicle. 9

8. a) What is a Photovoltaic Cell and how does it work ? Why solar powered vehicles need to be introduced ? 6

b) Explain with sketch the functioning of Electric powered vehicle and compare the same with IC engine operated vehicle. 9

9. Write short notes on any *three* of the following : 3 × 5

a) Variable valve timing

b) Camless engine

c) Computer controlled carburetor system

d) MPFI system.

10. Write the advantages and disadvantages of fuel cell. Describe the principle of operation of fuel cell. Compare between fuel cells with battery and fuel cells with internal combustion engines. 5 + 5 + 5

11. What are the necessities of Regenerative braking system ? Discuss the components which are used in Regenerative braking system. 5 + 10