Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (AUE)/SEM-7/AUE-713/2010-11

2010-11

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

      I. works on Atkinson cycle

      II. provide reduced CO_2 emissions

      III. use a power split device with a planetary gear in their transmission

      IV. are equipped with petrol engine and diesel engine

   Of these the correct answer is

   a) I & III b) I, II & III

   c) II & III d) II, III & IV.

ii) The human ear is most sensitive to frequencies around

I. 5000-10000 Hz

II. 1000-3500 Hz

III. 120 dB

IV. below 500 Hz.

Of these the correct answer is

a) II only b) I only

c) II & III d) II & IV.

iii) Source of aerodynamic noise is

a) gearbox b) differential

c) road surface d) motion of vehicle.

iv) The noise caused by the road depends on the

I. vehicle speed

II. tyre tread material

III. engine

IV. condition of road surface.

Of these the correct answer is

a) I only b) I, II & III

c) I, II & IV d) all of these.

v) Energy density of hydrogen fuel as liquid is

I. double that of petrol

II. half that of petrol

III. one fourth that of petrol

IV. almost same that of petrol.

Of these the correct answer is

a) I only b) II only

c) III only d) IV only.

vi) A regenerative brake system

I. is an apparatus

II. is used only for stop the vehicle

III. which allows a vehicle to recapture part of the kinetic energy that would otherwise be 'lost' to heat when braking

IV. make use of that power either by storing it for future use of feeding it back into a power system for other vehicles to use.

Of these the correct answer is

a) III only b) IV only

c) I, III & IV d) all of these.

vii) Knock sensor which is mounted on the

I. cylinder-block

II. exhaust manifold

III. inlet manifold

IV. gearbox.

Of these the correct answer is

a) I only b) II only

c) III only d) IV only.

viii) Single point fuel injection is also called

I. Central Fuel Injection (CFI)

II. Throttle Body Injection (TBI)

III. Direct Fuel Injection (DFI)

IV. Indirect Fuel Injection (IDI).

Of these the correct answer is

a) I only b) I & II

c) II only d) II & IV.

ix) Now a days, speed control system in an electric car is

I. potentiometric voltage controller

II. thyristor controller

III. microprocessor controller.

Of these the correct answer is

a) I only b) I & III

c) II or III d) none of these.

x) Common rail fuel injection system is used in

I. MPFI engine

II. diesel engine

III. solar power engine

IV. hydrogen engine.

Of these the correct answer is

a) I only b) II only

c) III only d) IV only.

GROUP – B

(Short Answer Type Questions)

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

2. What are the advantages and disadvantages of electric vehicle ?

3. What is photovoltaic cell and how does it work ? Why solar powered vehicles need to be introduced ?

4. The contact surfaces in a cone clutch have an effective diameter of 75 mm. The semi-angle of the cone is 15°. The co-efficient of friction is 0·3. Find the torque required to produce slipping of the clutch if an axial force applied is 180 N.

   This clutch is employed to connect an electric motor of battery vehicle running uniformly at 1000 rpm with flywheel is initially stationary. The flywheel has a mass of 13·5 kg and its radius of gyration is 150 mm. Calculate the time required for the flywheel to attain full speed and also the energy lost in the slipping of the clutch.

5. What are the control system components ? Explain their functions ?

6. What is unit injector ? Describe how the electronic unit injector works.

GROUP – C

(Long Answer Type Questions)

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

7. a) What is hybrid drives ?

   b) Explain the types of hybrid drives.

   c) Explain the layout of Toyota hybrid system. 2 + 6 + 7

8. a) What is noise ?

   b) What are the effects of noise on human beings ?

   c) Explain the sources of noise in a vehicle. 2 + 3 + 10

9. a) Explain with sketch, the functioning of electric powered vehicle and compare the same with IC engine operated vehicle.

b) From your point of view which type of vehicle is best those are mention below and why ? Explain with reason.

i) Hybrid vehicle

ii) Electric vehicle

iii) Hydrogen operated vehicle

iv) Stratified charge engine operated vehicle

v) Solar powered vehicle. 8 + 7

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

a) Camless engine

b) DTS-Fi

c) DTS-Si

d) Anti-lock braking system

e) Regenerative braking

f) Collapsible steering.

11. a) What is sensor ?

b) What are the different types of sensor used in a modern automobile vehicle ?

c) How sensors works ? 2 + 7 + 6