Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(AUE)/SEM-7/AUE-713/2009-10

2009

MODERN VEHICLE TECHNOLOGY (ELECTIVE - I)

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 of the following : 10 × 1 = 10

   i) Consider the following statements :

   Toyota hybrid vehicles

   I. provide reduced CO_2 emissions

   II. equipped with Petrol Engine and Diesel Engine

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

   IV. work on sterling heat cycle.

   Of the statements :

   a) I and III are correct b) II and III are correct

   c) I and IV are correct d) I, III and IV are correct.

ii) Consider the following statements :

Keeping in view of cleaner environment and to cut down vehicular noise, passenger cars uses

I. Stratified charge engine

II. Battery powered vehicle

III. Electric propulsion with cable

IV. Hydrogen fueled vehicle

V. Hybrid vehicle.

Of the statements :

a) I alone is correct b) II and III are correct

c) IV alone is correct d) V alone is correct.

iii) Consider the following statements :

Small and tiny efficient engine is used in

I. Toyota Prius

II. Honda Insight

III. Hyundai Accent

IV. REVA.

Of the statements :

a) I alone is correct b) II alone is correct

c) I and III are correct d) IV alone is correct.

iv) Consider the following statements :

Nowadays, speed control system in a Electric Car is

I. Potentiometric voltage controller

II. Thyrestor controller

III. Microprocessor controller

Of the statements :

a) I alone is correct

b) I and III are correct

c) II and III are correct

d) None of these.

v) Name the Indian car model in which stratified engine is used :

a) Esteem b) Ford Ikon

c) Santro d) Honda City.

vi) Mention the source of aerodynamic noise :

a) gearbox b) differential

c) road surface d) motion of vehicle.

vii) Name the Fuel producing Zero pollution in the atmosphere :

a) CNG b) LPG

c) Methanol d) Hydrogen.

viii) Name the component of automobile engine produces Slap noise :

a) Piston assy. b) connecting rod

c) crankshaft assy. d) camshaft assy.

ix) Common Rail Fuel Injection system is used in

a) MPFI engine b) diesel engine

c) hydrogen engine d) solar power engine.

x) Lamda sensor is used to monitor

a) nitrogen b) oxygen

c) CO_2 d) CO.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

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

3. What is Electronic Ignition ? How it works ?

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

5. Explain briefly the generation of Combustion Noise.

6. Provide plausible reasons for reduction of BSFC, smoke and carbon monoxide emissions in conventional CI engines when operated in dual fuel mode with hydrogen.

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. Name various models operating in India and abroad.

   b) What is a Photo-voltaic Cell and how does it work ? Why solar powered vehicles need to be introduced ?

   c) Explain with sketch, various methods of combining IC Engine with Electric Motor to drive a passenger vehicle. 3 + 4 + 8

8. a) What is Noise ? What are the effects of Noise on human beings ?

   b) Indicate the various sources of vehicle noise.

c) Explain briefly the intake, exhaust noise and noise due to cooling fan and other auxiliaries. 3 + 3 + 9

9. A car carrying 1100 kg is powered by a engine which develops 80 BHP at 4500 r.p.m. The corresponding vehicle speed in top gear is 80 kmph. The Forntal Area of the car is 1·8 m^2 and the air resistance coefficient is assumed as 0·0032 while air resistance is expressed in kg and vehicle speed in kmph. The rolling resistance is 0·015 times that of Gross Vehicle Weight. The car has rear axle ratio of 4·8 : 1 and Static Load Radius (SLR) of tyres is 0·3 m. Assume transmission efficiency at top gear as 0·90.

If the car is ascending a gradient of 1 in 22 at a speed of 80 kmph, calculate —

a) The driving force available in kg,

b) The total resistance in kg,

c) Car acceleration in m/sec^2. 5 + 5 + 5

10. a) How are petrol injection systems electronically controlled ?

b) Indicate the features of SPFI, MPFI and direct injection of fuel.

c) What is common rail fuel injection system ? Why is it used ? 5 + 5 + 5

11. a) Discuss the function of a sensor, actuator and control system ?

b) Indicate the different types of sensors used in automobiles and their uses. 6 + 9