Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(AUE)/SEM-7/AUE-713/2012-13

2012

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 of the following : 10 × 1 = 10

   i) Thermodynamic cycle of Toyota Hybrid vehicles engine

      a) compression ratio is more than expansion ratio

      b) expansion ratio is more than compression ratio

      c) compression and expansion ratio are same

      d) none of these.

   ii) The stoichiometric A/F ratio for compete combustion of hydrogen in air by mass basis is bout

      a) 34 : 1 b) 14·7 : 1

      c) 25 : 1 d) 10 : 1.

iii) Sources of aerodynamic noise is

a) differential b) gearbox

c) road surface d) motion of vehicle.

iv) Vehicle speed sensor is mounted on

a) engine b) transmission gearbox

c) speedometer d) both (b) and (c).

v) The most acurate petrol injection system is the

a) port injection b) direct injection

c) manifold injection d) throttle body injection.

vi) The amount of fuel delivered by the injector depends upon the

a) size of injector nozzle

b) length of time the injector is open

c) pressure pushing fuel through the injector

d) all the above factors.

vii) During ABS operation, most efficient braking occurs when the target slip rate (ratio) can be

a) 0% b) 100%

c) 10% to 30% d) 50% to 75%.

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

a) Thyristor controller

b) Potentiometric voltage controller

c) Microprocessor controller

d) both (a) and (c)

e) (a), (b) and (c).

ix) DTS-FI system generally used in

a) four wheeler technology

b) two wheeler technology

c) both (a) and (b)

d) none of these.

x) The fuel producing zero pollution in the atmosphere is

a) hydrogen

b) solar fuel

c) LPG

d) both (a) and (b)

e) all of these.

GROUP – B
(Short Answer Type Questions)

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

2. What is a hybrid system ? How many types of hybrid systems are being used in the hybrid vehicles currently on the market ? 2 + 3

3. Derive the theoretical or stoichiometric air-fuel ratio for complete combustion of hydrogen in air.

4. Compare the efficiency of ideal Atkinson & Otto cycle for a Compression ratio of 8. The condition of air before isentropic compression is 1 bar & 30°C. The maximum pressure in both cycles is 20 bar.

5. What are the different types of sensors used in a modern vehicle ?

6. Explain the main components of MPFI system.

GROUP – C
(Long Answer Type Questions)

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

7. Explain with neat sketch the hybrid transmission system using power split device. How does the hybrid system work ? 10 + 5

8. What is Anti-lock Brake System (ABS) ? Explain the ABS components and how the system components of hydraulic brakes / air brakes work ? 3 + 12

9. What is regenerative braking system ? What are the advantages of regenerative braking over conventional braking ? Describe the operation of regenerative braking system with neat sketch. 3 + 4 + 8

10. a) Explain the sources of noise in a vehicle.

    b) What is unit injector ? Describe how the electronic unit injector works ? What is pilot injection ?

    7 + (2 + 4 + 2)