MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : AUE-703A

COMBUSTION & POLLUTION CONTROL IN AUTOMOBILE

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) Photochemical smog is mainly due to

a) NOx and HC b) excess O_2

c) CO and CO_2 d) soot.

ii) NOx emission in SI engines will be lowest during

a) cruising b) idling

c) accelerating d) decelerating.

iii) Lead compounds were added in gasoline to

a) reduce HC

b) reduce knocking

c) increase power output

d) reduce exhaust temperature.

iv) Flame ionization detector is used for measuring

a) CO b) CO_2

c) NOx d) HC.

v) Three way catalytic converters reduce emission of

a) CO, CO_2 and soot

b) CO, CO_2 and HC

c) CO, CO_2 and NOx

d) CO, HC and NOx.

vi) Blue smoke in diesel engine indicate

a) NOx b) HC

c) CO d) Unburnt oil.

vii) One of the major Exhaust Emissions from CI engines compared to SI engine is

a) Oxides of Nitrogen

b) Unburnt hydrocarbons

c) Particulates

d) CO and CO_2.

viii) Decrease in air-fuel ratio in SI engines result in

a) Increase of NOx

b) Decrease of CO and Unburnt hydrocarbons

c) Increase of CO and Unburnt hydrocarbons

d) None of these.

ix) EGR is the most effective way of reducing

a) NOx b) HC

c) CO d) CO and HC.

x) Thermal converter cannot reduce emission of

a) CO b) HC

c) NOx d) Soot.

GROUP – B

(Short Answer Type Questions)

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

2. Explain emission as function of equivalence ratio in a SI and CI Engine.

3. Describe the causes of Hydrocarbon Emissions from SI engines.

4. Describe the Evaporative Emission Control Method.

5. What is cranks blow by ? How it is controlled ?

6. Explain the source of non-exhaust unburnt HC emission from engine.

GROUP – C

(Long Answer Type Questions)

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

7. a) Discuss in detail the mechanisms of formation of these major pollutants from I.C engine exhaust.

b) Describe in detail how the photochemical smog is formed.

8. What are Catalytic and Thermal Converter ? How are they helpful in reducing HC, CO and NO_x emission ? 6 + 9

9. Describe the effect of Crevice volume, Valve overlap and Equivalence Ratio in Automotive pollution and also explain in detail how particulate emissions are caused. 9 + 6

10. a) Discuss the cause of smoke formation in an I.C engine.

b) Explain the working principle of Hertridge smoke meter. 8 + 7

11. a) Explain the various methods use to control exhaust emission from I.C engines.

b) What do you understand by the term EGR ? Explain how EGR reduces NOx emission. 7 + 8