AUTOMOTIVE PETROL ENGINE (SEMESTER - 4)

CS/B.TECH (AUE-N)/SEM-4/AUE-403/09

1. .....
Signature of Invigilator

2. .....
Signature of the Officer-in-Charge

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/B.TECH (AUE-N)/SEM-4/AUE-403/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

AUTOMOTIVE PETROL ENGINE (SEMESTER - 4)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question.**
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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Marks Obtained

	Group – A						Group – B			Group – C				
Question Number													***Total Marks***	***Examiner's Signature***
Marks Obtained														

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Head-Examiner/Co-Ordinator/Scrutineer

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GROUP – A

(Multiple Choice Type Questions)

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

i) For the same compression ratio and heat addition, the ..... cycle has the highest thermal efficiency but for the same maximum pressure and heat addition, the ..... cycle has the highest air standard thermal efficiency.

a) Otto, Diesel b) Diesel, Otto

c) Dual, Diesel d) Otto, Dual. 2

ii) Knock in SI engines are a ..... phenomenon.

a) post-TDC

b) pre-TDC

c) TDC. 2

iii) Advancing the spark timing in petrol engine with respect to TDC ..... the tendency towards knocking while decreasing the speed of the engine ..... the tendency.

a) increases, decreases

b) increases, does not change

c) decreases, increases

d) does not change, decreases

e) increases, increases

f) decreases, decreases. 2

iv) Specific fuel consumption in MPFI engines is

a) better than carburetted engine

b) equal to that of carburetted engine

c) worse than carburetted engine

d) cannot be compared. 2

v) Mechanical efficiency may be defined as

a) Indicated Horse Power (IHP) to Brake Horse Power (BHP)

b) Brake Horse Power (BHP) to Indicated Horse Power (IHP)

c) Indicated Horse Power (IHP) – Brake Horse Power (BHP)

d) Indicated Horse Power (IHP) × Brake Horse Power (BHP). 1

vi) Petrol engine operates on

a) constant volume cycle

b) constant pressure cycle

c) dual combustion cycle

d) none of these. 1

GROUP – B

(Short Answer Type Questions)

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

2. What are the objectives of designing a carburettor for a typical SI engine. Explain with the help of a neat sketch, the A/F ratio demands of a typical SI engine with respect to throttle opening.

3. Starting from the general equation of combustion of a typical hydrocarbon fuel, derive the stoichiometric equation of combustion of isooctane.

4. Calculate the percentage change in the efficiency of an ideal Otto cycle having a compression ratio of 7, when the specific heat at constant volume increases by 1%.

5. Explain the phenomena of cold starting and carburettor icing with respect to fuel characteristics of a typical SI engine fuel. Your answer should be accompanied by a typical ASTM distillation curve for gasoline.

6. Explain the importance of octane number in the light of the knocking phenomena in SI engines.

GROUP – C

(Long Answer Type Questions)

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

7. Describe with a neat P-θ plot, the stages of normal combustion in a typical SI engine. Indicate clearly the region susceptible to knocking on the sketch so drawn. Explain in brief the factors influencing knock in SI engines. 15

8. With the help of neat schematic sketch derive the expression of A/F ratio as provided by a simple carburettor, taking into account the compressibility of air. Hence comment on the inherent limitations of such a carburettor in providing the requisite A/F ratio over the entire operating range of an SI engine. 15

9. Discuss with the help of neat sketches, the operation of a battery ignition system of a typical SI engine. Explain how the magneto-ignition system compares with the battery ignition system. 15

10. With the help of a neat sketch, derive the relation of instantaneous volume and surface area with respect to crank angle of typical internal combustion engine geometry. From the relation so derived, comment on how the ratio of V (θ)/A (θ) affects the combustion chamber design of a typical petrol engine. Your answer should be stated in the context of the different types of combustion chambers prevalent in SI engine design. 15

11. Discuss with neat sketches, the idling, acceleration and power adjustments made to a simple carburettor to accommodate the entire A/F ratio range encountered in a typical SI engine. 15

END