

M.E. Second Semester (Mechanical Engineering (Thermal Engg.)) (New - CGS)

13515 : Advanced Internal Combustion Engines : 2 MTE 1

P. Pages :2

Time : Three Hours



AU - 3367

Max. Marks : 80

- Notes : 1. Answer **any three** question from Section A and **any three** question from Section B.
2. Due credit will be given to neatness and adequate dimensions.

SECTION - A

1. With the help of suitable graph explain how SI engine mixture requirement for best power and best economy differ from each other. Based on this, discuss automotive SI engine mixture requirement for
a) Idling
b) Cruising
c) High Power 13
2. a) With suitable sketch and graph, Explain the combustion process in SI Engine. 7
b) Discuss the effect of the following parameters on flame propagation. 6
 - i) Mixture strength
 - ii) Type of fuel used
 - iii) Compression ratio
 - iv) Initial temperature of the charge.
3. a) Sketch and explain a typical P- θ diagram for CI engine. Based on this, Explain the phases of combustion in CI engine. 7
b) What is delay period? Explain the effect of following parameters on delay period. 6
 - i) Injection timing
 - ii) Load on the engine
 - iii) Nature of fuel.
4. a) List various fuel supply systems for CI Engine. Explain common rail system. What makes it suitable for modern CI engines? 7
b) With reference to the spray structure of the fuel, Explain the importance of 6
 - i) Atomization
 - ii) Spray Penetration
 - iii) Droplet size distribution
5. a) What is significance of providing octane rating to SI engine fuels? Explain the procedure for evaluating Octane number of the fuel. 7
b) What are the requirements of CI engine combustion Chamber? Explain the technique of generating induction swirl in CI engine combustion chamber. 7

SECTION - B

6. a) Explain the mechanism of formation of NO_x during the combustion process. Explain how NO_x emission leads to formation of photo-chemical smog. 8

- b) Take a review of emission norms priority existing in various parts of our country. 6
7. a) Discuss the effect of following pollutants on human health: 6
i) Carbon Monoxide
ii) Tropospheric ozone.
iii) NOx
- b) What are the 'Particulates'? How they are formed in CI engine combustion process? What are its effects on human health? 7
8. a) What is transesterification ? With neat sketch explain the single stage process for conversion of vegetable oil into bio-diesel. 7
- b) Discuss the suitability of CNG as CI engine fuel. 6
9. a) What do you mean by 'Alternative fuel'? What are the reasons that the alternative fuels are gaining importance. 5
- b) With a suitable schematic diagram, explain how hydrogen can be used as fuel for SI engine. What are the merits and demerits of hydrogen as fuel? 8
10. a) What are lean burn engines? What is the basic reason to adopt lean burn engine? What are the drawbacks associated with it? With simple sketch explain Toyota lean burn engine. 8
- b) Discuss the basic principle of Laser plasma ignition. What advantages it poses over conventional spark plug. 5

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