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Question Paper Code : 20758

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth Semester

Mechanical Engineering

CME 394 — ADVANCED INTERNAL COMBUSTION ENGINEERING

(Common to : Mechanical Engineering (Sandwich))

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need of fuel injection system in SI engine?
2. How the compression ratio affecting knock in SI engine?
3. What is meant by common rail direct injection?
4. Sketch the schematic representation of the disintegration of a CI fuel jet.
5. List the causes for hydrocarbon emission in SI engines.
6. Define driving cycle. Mention the factors to be considered during vehicle emission testing.
7. Mention the advantages of alcohol as a fuel.
8. List the various methods adopted for transesterification of bio diesel.
9. What is meant by lean burn engine?
10. Name various types of fuel cell. Suggest a suitable one for automobile application.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the three stages of combustion in SI engine.

Or

- (b) Describe the various types of combustion chambers used in SI engines with sketches.

12. (a) Explain the phenomenon of knock in CI engines with suitable plots.

Or

- (b) With a neat sketch explain the principle of exhaust turbo charging of a single cylinder engine.

13. (a) Describe the sources and formation of the following pollutants. (6)
(i) Carbon monoxide
(ii) NO_x. (7)

Or

- (b) How the diesel oxidation catalysts and particulate traps help to convert the pollutants present in the diesel engine exhaust gas into harmless constituents? Explain.
14. (a) Compare LPG and petrol as fuel for SI engines.

Or

- (b) Describe the various engine modifications required to use liquefied hydrogen as a fuel in SI engine.
15. (a) Describe the gasoline compression ignition system.
- Or
- (b) Describe series and parallel architecture of electric and hybrid vehicle.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the construction and working principle of three way catalytic converter with a sketch.
- Or
- (b) Explain the concept of HCCI. Also describe the various control mechanisms for HCCI.
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