Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R,S), MAY 2024
MECHANICAL ENGINEERING
(2020 SCHEME)

Course Code : 20MET342

Course Name: IC Engine Combustion And Pollution

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Formulate the combustion stoichiometry equation for the fuel C_xH_y
2. Differentiate between rich mixture and stoichiometric mixture.
3. Define the term "Knocking" in C.I. engines.
4. Why Diesel engines are called Compression Ignition engines?
5. Explain Squish motion in I.C. engines
6. What is a "Pre-Chamber"
7. Explain whether hydrogen can be directly injected in S.I. engines?
8. What are the advantages of using Natural gas in internal combustion engines?
9. Differentiate between PM2.5 and PM 10.
10. What is a three-way catalytic converter?

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Explain about any FIVE design and operating parameters that affect the performance of an I.C. engine. (10)
    b) Differentiate between Two Stroke engines and Four Stroke engines. (4)

OR

12. a) Explain the terms (i) Residual fraction (ii) Burned gas fraction (iii) mep (iv) EGR. (10)
    b) Define the term "Road-load Power" (4)

MODULE II

13. a) With the help of a P-θ diagram explain the stages of combustion process happening in Spark Ignition engines. (10)
    b) List the factors affecting flame speed in S.I. engines. (4)

OR

14. a) Explain about the effect of fuel/air ratio on (i) Efficiency (ii) Maximum Power (iii)Maximum Temperature (iv) Maximum Pressure (v) Exhaust Gas Temperature. (10)
    b) Why an S.I. engine requires a rich mixture for Idling and Accelerating? (4)

MODULE III

15. a) With the help of a Q-θ diagram explain the stages of combustion in C.I. engine. (10)
    b) Explain about Physical delay in combustion process. (4)

OR

16. a) Explain about various combustion chambers used in C.I. engines. (10)
    b) "Heterogeneous mixture is produced inside C.I. engines" What are your views on the statement ? (4)

MODULE IV

17. a) Write short notes on (i) Bio-Diesel (ii) LPG (iii) Natural gas (iv) Hydrogen (10)
    b) What are the potential environmental benefits of using alternative fuels? (4)

OR

18. a) With the help of a neat diagram explain about HCCI combustion. (10)
    b) With neat sketches explain the working of a hydrogen fuel cell. (4)

MODULE V

19. a) With the help of neat sketches explain about (i) EGR (ii) DPF (10)
    b) Explain about regeneration in particulate fitters (4)

OR

20. a) What are the effects of pollutants from C.I. engines on environment and human beings? How can these be controlled ? (10)
    b) Explain about Selective Catalytic Reduction. (4)

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