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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTERB.TECH DEGREE EXAMINATION (R), MAY 2023
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_aH_b
2. How does the combustion process influence the formation of nitrogen oxides (NOx) in the exhaust gas?
3. Explain partial burning in SI engine and its consequences.
4. List factors affecting flame speed
5. Explain swirl motion in I.C. engines
6. What are the factors that affect the ignition delay in C.I engines?
7. List any three advantages and disadvantages of alternate fuels.
8. List the advantages of using natural gas as I.C engine fuel.
9. Explain exhaust gas recirculation.
10. List the main pollutants regulated by emission standards in engines.

PART B

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

MODULE I

11. List and explain the various design and operating parameters that affect the performance of an I.C. engine. (14)

OR

12. Explain the terms (i) Residual fraction (ii) Burned gas fraction (iii) mep (iv) EGR (v) Road load power. (14)

MODULE II

13. Explain different stages of combustion in SI Engine with neat diagram (14)

OR

14. a) Explain abnormal combustion in SI Engine (10)
    b) S.I. engine requires a rich mixture for idling and accelerating. Justify your answer (4)

MODULE III

15. Explain different stages of combustion in CI Engine with neat diagram (14)

OR

16. Explain with figures various types of combustion chambers used in CI engine (14)

MODULE IV

17. Explain any five alternative fuels used in IC engine (14)

OR

18. a) With the help of a neat diagram explain about HCCI combustion. (7)
    b) With neat sketches explain the working of a hydrogen fuel cell. (7)

MODULE V

19. a) Discuss the operation and effectiveness of catalytic converters in controlling emissions from SI engines. How do they work to reduce pollutants like nitrogen oxides (NOx), carbon monoxide (CO), and hydrocarbons (HC)? (10)
    b) Write short note on Cetane number (4)

OR

20. Discuss the major pollutants emitted by SI engines and their environmental impact (14)

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