JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech II Semester Examinations, June/July - 2019
COMPUTER SIMULATION OF SI AND CI ENGINES
(Thermal Engineering)

Time: 3hrs　　　　　　　　　　　　　　　　　　　　　　　　　Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question
carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

1.a) Define and discuss the term 'heat of reaction' and its implications. [5]
　b) Discuss the assumptions made in case of ideal cycle S.I. engine simulation? [5]
　c) Enumerate the factors influence the S.I engine combustion. [5]
　d) Distinguish simulation process parameters for 2-stroke and 4-stroke SI engines. [5]
　e) Write the importance of heat transfer in IC engines? What are empirical models available
　　for determining heat transfer coefficient in CI engines? [5]

PART - B

5 × 10 Marks = 50

2.　Explain in detail the constant volume adiabatic combustion process by considering with
　　combustion of suitable fuel used in IC engines. [10]

OR

3.　Compute the flame temperature when a chemically correct mixture of C_8H_{18} and air
　　initially at 400 K and 1atm, burns at constant volume. [10]

4.　The compression ratio for an ideal Otto cycle is 9. At the beginning of the compression
　　stroke the pressure is 1 atm and the temperature 300 K. The peak pressure produced
　　because of combustion is 4.3 times the compression pressure. Determine
　　a) p, V, T values at the end of each process of the cycle
　　b) thermal efficiency, and
　　c) mean effective pressure.
　　Take the bore(B) and stroke (S) of the engine as 100 mm each; the ratio of specific heats
　　for air is 1.4 and Cv is 0.717 kJ/kg K. [10]

OR

5.a) What is the effect of part throttle on SI engine performance.
　b) Distinguish full and part throttle process in SI engine with reference to p-V diagram.
　　[5+5]

6.a) Distinguish Ideal and progressive combustion process in SI engines
　b) Explain in detail the progressive combustion process in SI engines with the help of p-V
　　diagrams. [5+5]

OR

7.a) Discuss the effect of different parameters for SI engine performance.
　b) Explain the simulation of gas exchange process in SI engines and develop energy
　　expressions at various stages. [5+5]

8.a) Explain procedure to analyze the mixing process in 2-stroke diesel engine.
 b) What are the modifications required to improve the thermal efficiency of 2-stroke engines? [5+5]

OR

9. Explain the effect of pressure- crank angle variation on the performance of 2 stroke SI engines. Also explain the significance of peak pressure. [10]

10.a) Explain the existence of various combustion models based on energy consumption of CI engines
 b) Discuss features of zero-dimensional combustion model in detail. [5+5]

OR

11.a) Distinguish between ideal and actual diesel engine cycles with suitable examples.
 b) Enumerate the factors influence the efficiency and the power output in CI engines.[5+5]

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