R15

Code No: 5221AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech I Semester Examinations, February - 2017
ADVANCED I.C. 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) What is the difference between air standard cycle approximation, fuel air cycle approximation and real cycle performance. [5]
b) How CI engine combustion chambers are classified? What type of swirl is used in these chambers? [5]
c) Discuss the general principles of SI engine combustion chamber design. [5]
d) What is the mechanism of smoke formation? What are the ways of controlling diesel smoke? [5]
e) Discuss about the adiabatic engine concept. [5]

PART - B **5 × 10 Marks = 50**

2.a) Explain various operating parameter and its influence on engine design.
b) What is chemical equilibrium? How does it affect the performance of the engine? [5+5]

OR

3.a) Define the following engine operating parameter:
i) Indicated power ii)Brake power iii) Specific fuel consumption
iv) Mechanical efficiency and v) Volumetric efficiency.
b) Discuss the effect of spark advance on the performance of an Otto cycle engine. What is the optimum spark advance? [5+5]

4.a) What are the various methods of turbocharging? Compare the relative merits.
b) What is the effect of volumetric efficiency on: i) engine power and ii) specific fuel consumption. [5+5]

OR

5.a) Explain how the induction swirl is created. What are requirements of injector with this type of swirl?
b) Why the turbulent type chambers cause higher heat transfer than the non-turbulent type. Discuss. [5+5]

6.a) Describe the phenomena of detonation in SI engine. On what factors does detonation depend?

b) What is meant by delay period? How it is divided Name and describe them. [5+5]

OR

7.a) Explain the stages of combustion in CI engine with the help of p-θ diagram.

b) Describe the principle of multi-point fuel injection system with the help of neat sketch. [6+4]

8.a) Describe the working principle of Chemiluminescence analyzer for the measurement of NO and NO_x.

b) What is the purpose of thermal reactor? What are its requirements? [8+2]

OR

9.a) Describe the trapping mechanism and regeneration of the trap.

b) Describe the working principle of a Hartridge smoke-meter with the help of a simple line diagram. [5+5]

10. Define the radiation mode of heat transfer. Give an expression to evaluate heat flux by radiation. Explain, why heat transfer by radiation in a CI engine is more significant than that in a SI engine. [10]

OR

11 a) Describe technical features of a GDI engine. What are its advantages and disadvantages?

b) Explain principle of operation of Wankel engine. [6+4]

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