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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
M.Tech I Year II Semester (R16) Regular Examinations May/June 2017
ADVANCED IC ENGINES

Time: 3 hours

Max. Marks:60

(Answer all Five Units 5 X 12 =60 Marks)

UNIT-I

- 1 a. List five important differences between the design and operating characteristics of spark ignition and Compression ignition engines. 6M
- b. What are the different air standard cycles that are used in IC engines? Explain. 6M

OR

- 2 Combustion in a diesel engine is assumed to begin at inner to dead centre and to be at constant pressure. The air-fuel ratio is 27:1, the calorific value of the fuel is 43000 KJ/kg, $0.71 + 20 \times 10^{-5} T$; R for the products = 0.287 kJ/kg K. If the compression ratio is 15:1, and the temperature at the end of compression 870 K, find at what percentage of the stroke combustion is completed. 12M

UNIT-II

- 3 a. Describe with the help of diagrams the air-swirl and squish in the C.I engine combustion chamber. 6M
- b. What do you mean by "Mean Velocity". Explain the turbulent characteristics of charge motion. 6M

OR

- 4 Briefly explain the working of the following: (i) Centrifugal supercharger. (ii) Roots supercharger. 12M

UNIT-III

- 5 a. Explain the formation of NO_x in detail. 6M
- b. What do you mean by particulates? Explain the various PM measurement techniques in detail. 6M

OR

- 6 The following data is taken from a trial on a 4 cylinder 4-stroke petrol engine which is coupled to a hydraulic dynamometer at constant speed with full throttle.
- BP with all cylinder working = 14.7 kW
BP with cylinder No: 1 cut out = 10.2 kW
BP with cylinder No: 2 cut out = 10.3 kW
BP with cylinder No: 3 cut out = 10.4 kW
BP with cylinder No: 4 cut out = 10.2 kW
Petrol used = 5.44 kg/h
Calorific value of the fuel used = 42,000 kJ/kg
Diameter of the cylinder = 8 cm
Stroke of the piston = 10 cm
Clearance volume = 100 cm³
- Find the mechanical efficiency and the relative efficiency. 12M

UNIT-IV

- 7 How will you develop the HCCI process in an existing IC engine? Briefly list out the challenges? 12M
- OR**
- 8 a. Describe the typical CNG fuel supply system with neat sketch 6M
b. List down various abnormalities in combustion and methods to control them. 6M

UNIT-V

- 9 a. Explain the effect of A:F ratio on CO, HC and NO_x emission from petrol engines. 6M
b. Explain the following: (i) Charge stratification. (ii) Exhaust gas treatment. 6M
- OR**
- 10 Explain with the help of diagram in the combustion phenomena in CI engines. 12M

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