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Question Paper Code : 21841

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Eighth Semester

Mechanical Engineering

ME 2041/10122 MEE 53/ME 807 — ADVANCED I.C. ENGINES

(Regulations 2008/2010)

(Common to 10122 MEE 53 – Advanced I.C. Engines for B.E. (Part-Time) Seventh Semester – Mechanical Engineering – Regulations 2010)

Time : Three hours Maximum : 100 marks

Use of approved thermodynamic tables and charts are permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the different Air-Fuel ratios required for different operating conditions of a gasoline engine.

2. State any four important types(shapes) of combustion chambers common in SI engines

3. What is the effect of delay period on knock in CI engines?

4. List any four assumptions made in the thermodynamic analysis of CI engine combustion process.

5. List the factors responsible for formation of NOx during combustion.

6. Indicate any four locations within the SI engine cylinder where unburnt HC form.

7. State any two reasons for using ethyl alcohol as a SI engine fuel.

8. Indicate any two limitations of vegetable oils as a CI engine fuel.

9. How does a lean burn engine differ from conventional engine?

10. List the components present in the measuring chain for pressure measurement in engine research.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain how the jet size and venture size are determined for a carburetor used in SI engines. (8)

(ii) Give the functions of boost venturi, emulsion tube, acceleration pump and altitude compensation mechanism present in actual carburetors. (8)

Or

(b) Using a pressure - crank angle diagram explain the desirable combustion for an SI engine and the effect of autoignition leading to abnormal combustion. Also explain the undesirable effects of auto ignition on engine?

12. (a) Using pressure-crank angle diagram explain the different stages of combustion observed a typical CI engine. Why is it undesirable to have the fourth phase of combustion (combustion during late expansion stroke)?

Or

(b) (i) Explain from first principles how the thermodynamic model to simulate the CI engine combustion heat release is developed. What are the assumptions made in this model. (8)

(ii) Using neat sketches explain any two types of turbo charger arrangements commonly used in multi-cylinder CI engines. (8)

13. (a) Explain in detail the how the un burnt hydrocarbon emissions occur inside the cylinder during the compression and power strokes of the SI engine.

Or

(b) Explain with neat sketches the construction of pellet type and honeycomb type Catalytic converters. Also explain how the catalytic surfaces are fabricated and discuss in detail how they perform the catalytic Conversion.

14. (a) Give a table describing in detail the comparison between alcohol, hydrogen natural gas, LPG and vegetable oils for their suitability as IC engine fuel. Consider all important factors pertinent to engine combustion.

Or

(b) What are the major engine modifications needed when unconventional fuels or their blends are used in conventional diesel Powered CI engine? Explain in detail.

15. (a) Using a neat layout diagram explain any one type of multipoint port fuel injection (MPFI) system employed in modem petrol cars. Explain the type of sensors used for measurement of air mass flow, temperature, speed and pressure.

Or

(b) Explain the procedure adopted to arrive at the specification of piezo electric sensor- charge amplifier crank- angle encoder and AD convener with data storage for heat release analysis of a given IC engine.
