Reg. No. : V E E R A P A N D I A N

Question Paper Code : 71841

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Eighth Semester

Mechanical Engineering

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

(Regulation 2008/2010)

(Common to 10122 MEE 53 – Advanced I.C. Engines for B.E. (Part-Time) Seventh Semester – Mechanical Engineering – Regulation 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. Why a S.I engine requires a rich mixture during idling and at full load?

2. What is the principle of a carburetor? How are jet and venturi sizes decided?

3. Define physical delay and chemical delay.

4. What is the effect of increasing the temperature and pressure on knocking in a C.I. engine?

5. What is a three way catalytic converter? Give the catalysts used in it.

6. What are emission norms? Give the major pollutants that are to be controlled.

7. What are the problems of using methanol in an engine?

8. List down four properties that are important in the selection of a fuel for an engine.

9. What is a multivalve engine? Indicate its advantages.

10. What do you understand by CRDI system? Give its salient features.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the air fuel ratio requirements of a S.I engine. (8)

(ii) Describe the various stages of combustion in a S.I. engine with a p – θ diagram. (8)

Or

(b) (i) Explain the various factors that affect knock in a S.I. engine. (8)

(ii) Discuss the different types of combustion chambers employed in a S.I. engines. (8)

12. (a) (i) Explain with a p – θ diagram the various stages of combustion in a CI engine. (8)

(ii) Discuss the characteristics of DI and IDI diesel engines. (8)

Or

(b) (i) What do you understand by turbo-charging? Why S.I. engines are not usually turbocharged? Give the boost pressure range for SI and CI engines. (6)

(ii) What do you understand by thermodynamic analysis of C.I. engine combustion process? Explain in detail giving the governing equations. (10)

13. (a) (i) Explain the mechanism of formation of CO, UBHC and NOx emissions. (8)

(ii) Why three way catalytic converters are employed in the modern day S.I engine driven vehicles? Show the plot of pollutants versus air fuel ratio and conversion efficiency versus air fuel ratio for all the major pollutants from S.I engines. (8)

Or

(b) (i) With the help of a neat sketch describe the principle of operation of FID analyser. (8)

(ii) Draw the Indian driving cycle and explain the various stages. (8)

14. (a) (i) Discuss the salient properties of hydrogen as a fuel. (8)

(ii) List down the advantages and disadvantages of using bio diesel in C.I. engines. (8)

Or

(b) (i) What modifications are required in a C.I. engine to use gaseous fuels? Explain. (8)

(ii) Explain the combustion and emission characteristics of using hydrogen in a C.I. engine. (8)

15. (a) (i) What is a lean burn engine? Explain its advantages and disadvantages. (8)

(ii) With a neat sketch explain the operation of an electronic fuel injection system used in a S.I. engine. (8)

Or

(b) (i) Explain the operation of CRDI engine with a neat sketch. (8)

(ii) Discuss the method of obtaining the rate of heat release from engines. (8)