Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20349

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Eighth Semester

Mechanical Engineering

ME 2041 — ADVANCED I.C. ENGINES

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List down the air fuel ratio requirements of a S.I.engine.

2. Mention the different jets used in a carburettor.

3. What do you understand by spark knock and diesel knock?

4. How the thermodynamic analysis of a CI engine is different from a SI engine?

5. Indicate any four sources of unburnt hydrocarbon emissions.

6. What is the principle of Flame Ionisation Detector?

7. Compare the octane number and the calorific value of alcohol with petrol.

8. List down the major constituents of natural gas and LPG.

9. Mention the principle of a surface ignition engine.

10. How the in-cylinder pressure is measured in an engine?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the various stages of combustion in a S.I. engine with a p-θ diagram. (8)

(ii) What action can be taken with regard to the following variables in order to reduce the possibility of detonation in a S.I engine? Justify your answers by reasons.

(1) Compression ratio

(2) Ignition timing

(3) Mixture inlet temperature

(4) Distance of flame travel (8)

Or

(b) (i) Describe the features of any two S.I engine combustion chambers. (8)

(ii) Explain the thermodynamic analysis of S.I. engine combustion showing clearly the various terms involved in the governing equation. (8)

12. (a) (i) Explain with the help of a p-θ diagram the various stages of combustion in a CI engine. (10)

(ii) Discuss about the normal combustion and abnormal combustion in a CI engine. (6)

Or

(b) (i) Distinguish between DI and IDI diesel engines with neat sketches. (6)

(ii) Explain the principle of operation of a turbocharger with a neat sketch, Indicate the objectives of turbocharging. (10)

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

(ii) Explain the principle of operation of a three way catalytic convertor with a neat sketch. (8)

Or

(b) (i) With the help of a neat sketch explain the principle of operation of NDIR analyser. (6)

(ii) Draw the Indian driving cycle and explain the various stages. (4)

(iii) Write a note on emission norms indicating clearly the need and the pollutants that are covered in the norms. (6)

14. (a) (i) Explain any three techniques of using alcohol in diesel engines. (12)

(ii) List down the advantages and disadvantages of using biodiesel in engines. (4)

Or

(b) (i) Compare the important properties of LPG with petrol. (8)

(ii) Discuss the performance combustion and emission characteristics of using hydrogen in SI engines. (8)

15. (a) (i) Explain the characteristics of a homogeneous charge compression ignition engine. (8)

(ii) What do you understand by lean burn engine and stratified charge engine? Indicate their advantages? (8)

Or

(b) (i) Discuss the operation of gasoline direct injection system with a block diagram showing clearly all the sensors. (8)

(ii) Explain the method of obtaining heat release rate of an IC engine. (8)