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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Seventh Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec. - 2014

Internal Combustion Engines

Time: 3 hrs

Max. Marks: 100

Note: Answer any **FIVE** full questions, selecting at least **TWO** full questions from each part.

PART - A

1. a. Why actual indicated thermal efficiency of the SI engine is low? Briefly explain. 5
- b. Explain briefly the effects of dissociation on: 8
 - i) temperature at different strengths and ii) Power
- c. What is the effect on %ge change in the efficiency of Otto cycle having a compression ratio of 7, if the specific heat at constant volume increase by 1%. 7
2. a. With a neat sketch of P-θ diagram explain briefly the stages of combustion in SI engine. At what angle the best performance can be obtained? 10
- b. List the engine variables which will effect the ignition lag. 4
- c. With a neat sketch explain briefly mixture requirements at different load and speed. 6
3. a. Explain briefly the following events that occur after injection of fuel: 10
 - i) atomization ii) vapourisation iii) mixing iv) self ignition v) combustion.
- b. List the factors affecting the delay period. 4
- c. What are the differences in knocking phenomenon of the SI and CI engines? 6
4. a. Explain briefly the methods of intensifying the rate of burning. 6
- b. With neat sketches explain briefly:
 - i) L-head type 6
 - ii) F-head type combustion chambers.
- c. List the methods of generating air swirl in CI engine combustion chambers. 2
- d. Explain briefly:
 - i) Pre-combustion chamber 6
 - ii) Energy cell.

PART - B

5. a. Briefly explain the families of hydrocarbons giving their general formulae and their molecular arrangements 4
- b. What are the important qualities of i) SI engine ii) CI engine fuels. Briefly explain. 8
- c. List the advantages and disadvantages of alcohol as an alternate fuel. 4
- d. Write a short note on biogas. 4

- 6 a. What are the types of fuel injection systems used in Diesel engines? Explain briefly
 - i) Individual pump and nozzle with separated pumps system 8
 - ii) Common rail system.
- b. Explain briefly ; i) Direct Injection 6
 - ii) Indirect injection used in SI engines.
- c. List the merits and demerits of petrol injection. 6
- 7 a. What are the objectives of super charging and what are its effects? 4
- b. With neat sketches explain the different arrangements for supercharging. 8
- c. List the advantages and disadvantages of stratified charge engine. 4
- d. Explain the construction and working of Wankel rotary combustion engine. 4
- 8 a. List the reasons for hydrocarbon emission from SI engines. 4
- b. Explain with a neat sketch how NO_x is reduced in petrol and diesel engines using EGR. 8
- c. Explain briefly catalytic converter package. 8

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