Seventh Semester B.E. Degree Examination, June/July 2011
Internal Combustion Engine

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. Explain with the help of P.V diagram, the loss due to variation of specific heat in an Otto cycle **(07 Marks)**
   b. Explain the effect of chemical equilibrium loss on i) Peak temperature and ii) On power output. **(06 Marks)**
   c. What is the effect of percentage change in the efficiency of Otto cycle having a compression ratio of 7, if the specific heat at constant volume increases by 1%. **(07 Marks)**

2 a. What is ignition lag? Describe the effect of following engine variable on ignition lag:
      i) Mixture ratio. ii) Electrode gap. iii) Initial temperature and pressure. **(07 Marks)**
   b. Describe the phenomenon of detonation. On what factor does detonation depends? **(07 Marks)**
   c. Sketch and explain the working principle of simple carburetor. **(06 Marks)**

3 a. With a suitable P-θ diagram explain the stages of combustion in C.I. Engines. **(08 Marks)**
   b. Explain the effect of following factors on delay period. i) Compression ratio. ii) Fuel. iii) Injection advance angle. **(06 Marks)**
   c. Write short note on: i) Cetane number. ii) Diesel index. **(06 Marks)**

4 a. Explain the requirements of a good S.I Engine combustion chamber for the following condition. i) High power output ii) High thermal efficiency iii) Smooth engine operation. **(10 Marks)**
   b. With a neat sketch explain the air-cell combustion chamber. **(10 Marks)**

PART – B

5 a. Explain the four main constituents of crude petroleum, Giving their general formula, molecular structure. Also mention whether they are saturated or unsaturated compounds. **(10 Marks)**
   b. Explain why n-heptane knocks badly whereas iso-octane is highly knock-resistant. **(02 Marks)**
   c. Compare the following properties of alcohols with gasoline as Engine fuels i) Airfuel ratio. ii) Calorific value. iii) Latent heat of vaporization. iv) octane rating. **(08 Marks)**

6 a. With suitable sketches explain the "working principle" of jerk pump. **(10 Marks)**
   b. Mention four major advantages of fuel injection in S.I. Engine. **(04 Marks)**
   c. Why thermostat is used in engine cooling system. Sketch and explain working principle of a typical thermostat. **(06 Marks)**

7 a. Explain the effect of Supercharging an i) Power output ii) Mechanical efficiency and on iii) Fuel consumption of an engine. **(06 Marks)**
   b. What is a stratified charge engine? Explain any two advantages of burning leaner overall fuel-airmixture. **(06 Marks)**
   c. With suitable sketches, describe the working principle of Wankel combustion engine. **(08 Marks)**

8 a. Explain the mechanism of formation of the following pollutants from S.I Engines i) Carbon monoxide [CO], ii) Oxides of Nitrogen (NO_x) **(06 Marks)**
   b. What is meant by total emission control package? Describe with sketch the catalytic converter package. **(08 Marks)**
   c. With a suitable diagram explain the exhaust gas recirculation device for the control of oxides of nitrogen. **(06 Marks)**

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