B. Tech.

(SEM. IV) EXAMINATION, 2006-07

I.C. ENGINE

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions. All questions carry equal marks.

1 Attempt any four parts of the following:

(a) Define compression ratio. What is its range for (i) the SI engine (ii) the C.I. engine? What factors limit the compression ratio in each type of engine?

(b) Why two stroke cycle CI engine finds wider use where as two stroke cycle SI engines are used only to a very limited extent.

(c) How the energy flows through reciprocating engine? Explain in brief.

(d) Explain the working of a four stroke S.I. engine with the help of a suitable sketch.

(e) Define energy, work, heat and properties.

(f) Derive general energy equation for a non flow process.

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2 Attempt any two parts of the following:
(a) What are the assumptions made in air standard cycle analysis?
(b) Show the carnot cycle on PV and T-s diagrams and derive an expression for its efficiency. Comment on the significance of this result as it relates to source and sink temperature.
(c) Why a rich mixture is required for idling and for maximum power? Why it is lean for cruising range? Why the simple corburator does not perform this function?

3 Attempt any two parts of the following:
(a) Discuss the basic requirements of a spark-ignition system. Describe a battery ignition system with the help of a sketch.
(b) What are the objects of super-charging? Which engine is more suitable for supercharging-SI engine or CI engine? Why?
(c) What are the various methods of turbo charging? Compare their relative merits.

4 Attempt any two parts of the following:
(a) Why cooling of an internal combustion engine is necessary? How does the temperature within the cylinder vary during a cycle?
(b) How airfuel ratio, compression ratio, engine speed, engine power and spark advance (timing) affect the cylinder temperature?
(c) Discuss various methods of determining engine friction. What are the functions of lubricant in an engine?

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5 Attempt any four parts of the following:

(a) What is ignition lag? Discuss the effects of engine variables on ignition lag.

(b) Why is flame speed important? What is the most important single factor affecting flame speed?

(c) Sketch heat balance curves for an SI engine at constant speed and discuss the nature of curves.

(d) Explain the stages of combustion in a CI engine. Does the flame front exist in a CI engine? Explain.

(e) What is meant by “delay period”? What is its importance?

(f) How do the injection timing and fuel quality affect the diesel knock?