S.E - Mech, sem - II
Nov - Dec - 2012, 2008 pattern

Total No. of Questions—12]          [Total No. of Printed Pages—4+2

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**[4262]-117**

### S.E. (Mech.) (Second Semester) EXAMINATION, 2012

### I. C. ENGINES

### (2008 PATTERN)

**Time : Three Hours**                    **Maximum Marks : 100**

**N.B. :—** (i) Answer *three* questions from Section I and *three* questions from Section II.
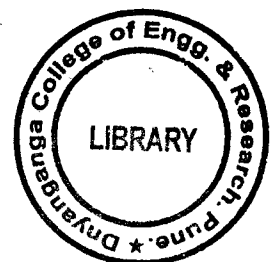
(ii) Answers to the two Sections should be written in separate answer-books.

(iii) Neat diagrams must be drawn wherever necessary.

(iv) Figures to the right indicate full marks.

(v) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(vi) Assume suitable data, if necessary.

### SECTION I

1.  (a)  Compare Otto and Diesel cycles for :

    (i) Constant maximum pressure and same heat input.

    (ii) Same compression ratio and same heat input.

    (iii) Same maximum pressure and temperature.          [9]

P.T.O.

(b) An air standard diesel cycle has a compression ratio of 14. The pressure at the beginning of the compression stroke is 1 bar and temperature is 27°C. The maximum temperature is 2500°C. Determine thermal efficiency, stroke volume and mean effective pressure. [9]

*Or*

2. (a) What is exhaust blowdown loss ? Discuss the optimum opening position of exhaust valve to reduce this loss. [4]

(b) Explain with P-V diagram the loss due to variation of specific heat in Otto cycle. [6]

(c) Derive an expression for the mean effective pressure of the Otto cycle. [6]

(d) List the important reciprocating engine parts and their materials. [2]

3. (a) Describe the stages of combustion in S.I. engines with the help of P-Q diagram. [8]

(b) The throat diameter of a carburettor is 9 cm and nozzle diam is 5.5 mm. Air and fuel discharge coefficients are 0.85 and 0.7 respectively. Nozzle lip is 6 mm. Pressure difference causing flow is 0.1 bar. Find :

(i) A/F ratio

(ii) Mean velocity of air required to start the fuel injection through nozzle.

Take density of air as 1.2 kg/m$^3$ and density of fuel as 750 kg/m$^3$. [8]

*Or*

**4.** (*a*) Discuss the effect of the following engine variables on flame propagation :

  (*i*) Fuel-Air ratio

  (*ii*) Compression ratio

  (*iii*) Engine load

  (*iv*) Turbulence. [8]

  (*b*) What is abnormal combustion knock ? How can we differentiate between normal combustion knock and abnormal combustion knock. [8]

**5.** (*a*) Explain the phenomenon of diesel knock. Compare it with the detonation in S.I. engines. [8]

  (*b*) How are C.I. engine combustion chambers classified ? Discuss with a neat sketch 'M' combustion chamber. [8]

*Or*

**6.** (*a*) Explain the stages of combustion in C.I. engines with the help of P.Q. diagram. [8]

  (*b*) Explain how induction swirl is created. Compare induction swirl with compression swirl. [8]

## SECTION II

7. (a) List various electronic ignition systems in use. Describe any *one* of them. State its advantages over conventional ignition system. [10]

   (b) Define and differentiate between :

   (i) Boundary lubrication

   (ii) Hydrodynamic lubrication

   (iii) Elastohydrodynamic lubrication. [8]

*Or*

8. (a) What is the advantage of pressurised cooling ? How is pressurizing accomplished ? [6]

   (b) Explain the working of spring loaded mechanical governor with the help of neat sketch used for diesel engines. [8]

   (c) Write a note on starting system. Explain any *one* system with a neat sketch. [4]

9. (a) What are the different methods used to measure brake power. Explain any *one* method with a neat sketch. [6]

(b) An eight cylinder, four stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 rpm on a dynamometer which has 54 cm arm. During a 10 minutes test the dynamometer scale beam reading was 42 kg and the engine consumed 4.4 kg of gasoline having a calorific value of 44000 kJ/kg. Air at 27°C and 1 bar was supplied to the carburettor at the rate of 6 kg/min. Find :

(i) The brake power delivered

(ii) BMEP

(iii) BSFC

(iv) Brake thermal efficiency

(v) Volumetric efficiency

(vi) Air-fuel ratio.                                          [10]

*Or*

**10.** (a) Describe the Morse Test. What is the assumption made in this test ? What is the accuracy of this test ?          [6]

(b) Explain the methods used for the measurement of fuel consumption with neat sketch.          [6]

(c) What are the methods used for improving engine performance ? Explain.          [4]

11. (a) What is air pollution ? Explain the contributors to air pollution and their harmful effects on human beings. [8]

(b) What are the alternative fuels used for diesel engine ? Discuss the advantages of any *one* fuel over diesel. [8]

*Or*

12. (a) What are Euronorms ? Are they different from Bharat norms ? Enlist emission norms for trucks and buses. [8]

(b) Write short notes on :

(i) Catalytic converter

(ii) Hybrid vehicles. [8]