

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- VIth SEMESTER-EXAMINATION – MAY- 2012****Subject code: 161902****Date: 11/05/2012****Subject Name: Internal Combustion Engines****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) With a neat sketch explain the valve timing diagram of four stroke petrol engine. **07**
(b) Explain the phenomenon of dissociation. **07**

- Q.2** (a) State the various methods of governing of IC engines and discuss any one of them. **07**
(b) The compression ratio of an engine working on Otto cycle is 7 and A:F ratio used is 15:1 and CV of fuel used is 40,000 KJ/kg. The temperature and pressure at the beginning of compression are 47°C and 1 bar. Determine the maximum pressure reached in the cycle. The compression follows the law $p v^{1.38} = C$ and $c_v = (0.7 + 20 \times 10^{-5} T)$ KJ/kg K, where T is in K. Also find the maximum pressure of the cycle assuming $c_v = 0.7$ KJ/kg K. **07**

OR

- (b) Explain the phenomenon of knocking in SI engines. **07**

- Q.3** (a) State the objects of supercharging of IC engines and explain turbocharging. **07**
(b) State the different scavenging systems and discuss any two of them. **07**

OR

- Q.3** (a) State the different methods of supercharging and discuss any two of them. **07**
(b) Explain the working of battery ignition system. State its advantages and disadvantages over magneto ignition system. **07**

- Q.4** (a) Write a note on mpfi system for modern automobiles. **07**
(b) With a line diagram explain the working of common rail fuel injection system. **07**

OR

- Q.4** (a) State the different types of carburetors and explain working of any one of them. **07**
(b) Explain construction and working of bosch fuel pump. **07**

- Q.5** (a) In a Morse test with four cylinder four stroke petrol engine, the following data were obtained for a particular setting and speed. **07**
Brake power with all cylinders working = 32.0
Brake power with no. 1 cylinder cut out = 21.6
Brake power with no. 2 cylinder cut out = 22.3
Brake power with no. 3 cylinder cut out = 22.5
Brake power with no. 4 cylinder cut out = 23.0
Estimate the indicated power of the engine and its mechanical efficiency.

- (b) Explain the effect of different pollutants on human and plant life. 07

OR

- Q.5 (a) The following observations were taken during a test on a single cylinder low speed four stroke cycle oil engine having a bore of 30 cms and stroke of 45 cms : 07

Ambient air temperature = 20°C, duration of trial = 1 hr, total fuel consumption 11.4 kg/hr, calorific value of fuel = 42,000 KJ/kg K, rpm = 300, indicated mean effective pressure = 6 bar, net brake load = 1.5 kN, brake drum diameter = 1.8 m, brake rope diameter = 2 cm, Quantity of jacket cooling water = 660 kg/hr, temperature of entering cooling water = 20°C, temperature of leaving cooling water = 75°C, Quantity of air as measured = 250 kg/hr, specific heat of exhaust gas $c_p = 1$ KJ/kg K, exhaust gas temperature = 420 °C. Determine :

- (i) indicated power
- (ii) brake power
- (iii) mechanical efficiency

Draw heat balance sheet on hour and % basis.

- (b) Define the following terms : 07
Cloud point, pour point, Cetane number and HUCLR.
