

**GUJARAT TECHNOLOGICAL UNIVERSITY**

B. E. Sem. - V - Examination – June- 2011

**Subject code: 150201****Subject Name: Automobile Engines**

Date: 27/06/2011

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) Differentiate between 4- stroke C.I. engine and S.I. engine with respect to parameters like thermodynamic cycle, compression ratio, air fuel ratio, ignition system, operating speed, piston speed, governing, operating compression temperature and pressure, maximum pressure, mean effective pressure, thermal efficiency, distribution of fuel, supercharging, starting, weight to power ratio, noise and vibration, S.F.C., and applications **07**
- (b) Actual valve timing diagram of C.I. engine and S.I. engine with neat sketch, explaining the reasons for the each event for opening and closing of the valve. **07**
- Q.2** (a) Derive the equation for simple carburetor **07**  

$$F/A = A_f/A_2(\rho_f/\rho_a)^{1/2} [1 - (\rho_f g h/p_1-p_2)]^{1/2}$$

$$F/A = \text{Fuel air ratio}, A_2 = \text{Area of throat}, A_f = \text{Area of Fuel nozzle}, \rho_f = \text{Density of fuel}, \rho_a = \text{Density of air}, h = \text{Height of nozzle tip above the fuel level}, P_1 = \text{Atmospheric pressure}, P_2 = \text{pressure of air at venturi throat.}$$
 State the Drawback of the simple carburetion.
- (b) Explain Wankel engine. **07**
- OR**
- (b) Explain briefly cold starting aids for C.I. engines. **07**
- Q.3** (a) Design the size of fuel orifice for simple carburetor to give 13:1 Air-Fuel ratio if the venturi throat is 35 mm in diameter and the vacuum at the venturi is 65 mm of Hg. Take  $C_{da} = 0.92$  and  $C_{df} = 0.95$ . The air temperature and pressure at carburetor inlet are 1 bar and 20° C. The fuel orifice is at the same level as that of the float chamber fuel. Take  $\rho_{air} = 1.29 \text{ Kg/m}^3$ ,  $\rho_{fuel} = 750 \text{ Kg/m}^3$  and  $\gamma = 1.4$  **07**
- (b) Differentiate between LPG and CNG as fuel for I.C. engine. **07**
- OR**
- Q.3** (a) Explain Common rail Diesel injection system. **07**
- (b) Explain Multi point fuel injection system. **07**
- Q.4** (a) Abnormal combustion knock produced by surface ignition in S.I. engines is more harmful than normal combustion knock.—justify the statement. Write in brief about additives for diesel engine fuels. **07**
- (b) Explain the stages of combustion with P-θ diagram in C.I. engines. **07**
- OR**
- Q.4** (a) Classify the combustion chambers of C.I. engines. Explain with neat sketch the working of “M” combustion chamber. **07**
- (b) Explain the over-cooling and under-cooling of an I.C. engine with its merits and demerits. **07**  
 Explain the various properties of lubricants of an I.C. engines.

- Q.5 (a)** Explain the effects of Pollutants on environment from gasoline engines and its control. **07**
- (b)** Compare the quantity of water required for 90 Kw petrol and diesel engines in which water is raised in temperature by 27°C in passing through the jackets .In the petrol engine the percentage of energy going to coolant is 32% and in diesel engine is 28%.The efficiencies of petrol and diesel engines are 25% and 30% respectively. **07**

**OR**

- Q.5 (a)** S.I. engines are generally not supercharged but supercharging is essential for an air-craft engines.---justify the statement. **07**  
Differentiate between supercharging and turbo charging.
- (b)** A four cylinder 4-stroke cycle engine 82.5 mm bore and 130 mm stroke develops 28 Kw while running at 1500 r.p.m. and using a 20% rich mixture. If the volume of air in the cylinder when measured at 15.5°C and 762 mm of Hg is 70% of swept volume, the theoretical air-fuel ratio is 14.8, C.V.=45980 KJ/Kg and the mechanical efficiency of the engine is 90%,find(1)The indicated thermal efficiency.(2) The brake mean effective pressure .Take  $R=287 \text{ N-M/Kg-}^\circ\text{k}$  **07**

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