

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013****Subject code: 711102N****Date: 04-06-2013****Subject Name: Fundamentals of I.C. Engine and Automobile****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) Define I.C. Engine. How these engines are classified? **06**
- (b) An engine operating on diesel cycle has the following particulars. **06**
 Pressure and volume at beginning of compression = 100 kPa and 0.03m^3
 Pressure after isentropic compression = 4.2 MPa
 Pressure after isentropic expansion = 200 kPa
 Determine:
 (i) Compression ratio (ii) Cut-off ratio (iii) Expansion ratio
 (iv) Cycle work (v) Cycle efficiency and (vi) Mean effective pressure
 Take $\gamma = 1.4$, $C_v = 0.718 \text{ kJ/kg K}$
- Q.2** (a) What is transfer box? Where it is used? Describe clearly the construction and working of any transfer box? **06**
- (b) What do you understand by stratified charged engine? Write the name of different method used for stratification. Discuss any one of them. **06**
- OR**
- (b) A venturi of a carburetor is to be designed to supply 5 kg/min of air at atmospheric condition of 1.013 bar and 300 K. If the velocity through the venturi is limited to 90 m/sec, find the diameter of the venturi. Take velocity = 0.8. Assume flow is compressible and isentropic. **06**
- Q.3** (a) Explain the terms camber, caster, and king-pin inclination. What are effects of each on steering characteristics of a vehicle? **06**
- (b) With the help of neat sketch, explain construction of piston. What are the desirable properties of material of I.C. engine piston? **06**
- OR**
- Q.3** (a) Discuss on : hydrogen as alternate fuel in I.C. Engine (motor vehicles) **06**
- (b) With the help of neat sketch, explain construction of crankshaft. Explain the types of crankshaft. **06**
- Q.4** (a) Explain working of mechanical and pneumatic governors with neat sketch briefly for C.I. engine. **06**
- (b) Discuss the microprocessor and microcomputer application in automobiles. **06**
- OR**
- Q.4** (a) Write short notes on (i) Tube tyre (ii) Tubeless tyres. **06**
- (b) Define the term. **06**
 (i) Indicated Power (ii) Volumetric Efficiency (iii) Thermal efficiency
 (iv) Relative efficiency (v) Mean effective pressure (vi) Brake power
- Q.5** (a) What do you understand by adiabatic engine? **06**
- (b) Explain the three different components (units) of MPFI electronic-system briefly. **06**

OR

- Q.5 (a)** What is poppet valve? Explain construction of poppet valve with neat sketch. **06**
Write the name of material used in poppet valve.
- (b)** A 6-cylinder, 4-stroke oil engine develops 200 kW at 1200 r.p.m. and consumes **06**
0.3 kg/kWh. Determine the diameter of a single orifice injector if the injection
pressure is 200 bar and combustion chamber pressure is 40 bar. The injection is
carried out for 30° rotation of a crank. Each nozzle on a cylinder provided with
single orifice. Take $\rho_f = 900 \text{ kg/m}^3$ and $Cd_f = 0.7$ where Cd_f = coefficient of
discharge of fuel diameter.
