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. Define õI.C. Engine.ö How these engines are classified? 0.1 **(a)** 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 kPaDetermine: (i) Compression ratio (ii) Cut-off ratio (iii) Expansion ratio (iv) Cycle work (v) Cycle efficiency and (vi) Mean effective pressure Take = 1.4, $C_v = 0.718 \text{ kJ/kg K}$ What is transfer box? Where it is used? Describe clearly the construction and 0.2 **(a)** 06 working of any transfer box? (b) What do you understand by stratified charged engine? Write the name of 06 different method used for stratification. Discuss any one of them. OR (b) A venturi of a carburetor is to be designed to supply 5 kg/min of air at 06 atmospheric condition of 1.013 bar and 300 K. If the velocity through the venture is limited to 90 m/sec, find the diameter of the venturi. Take velocity = 0.8. Assume flow is compressible and isentropic. 0.3 **(a)** Explain the terms camber, caster, and king-pin inclination. What are effects of 06 each on steering characteristics of a vehicle? (b) With the help of neat sketch, explain construction of piston. What are the 06 desirable properties of material of I.C. engine piston? OR Discuss on : hydrogen as alternate fuel in I.C. Engine (motor vehicles) Q.3 06 (a) With the help of neat sketch, explain construction of crankshaft. Explain the **(b)** 06 types of crankshaft. Explain working of mechanical and pneumatic governors with neat sketch briefly 06 **Q.4 (a)** for C.I. engine. (b) Discuss the microprocessor and microcomputer application in automobiles. 06 OR Write short notes on (i) Tube tyre (ii) Tubeless tyres. 0.4 **(a)** 06 Define the term. **(b)** 06 (i) Indicated Power (ii) Volumetric Efficiency (iii) Thermal efficiency (iv) Relative efficiency (v) Mean effective pressure (vi) Brake power 06 Q.5 **(a)** What do you understand by adiabatic engine? Explain the three different components (units) of MPFI electronic-system briefly. 06 (b)

- 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^{0} rotation of a crank. Each nozzle on a cylinder provided with single orifice. Take $_{\rm f} = 900$ kg/m³ and Cd_f = 0.7 where Cd_f = coefficient of discharge of fuel diameter.
