*Seat No.: _____* *Enrolment No._____*

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M.E Sem-I Examination January 2010**

## Subject code: 711102

## Subject Name: Fundamentals of I.C. Engines & Automobile

**Date: 22 /01 /2010** **Time: 12.00 – 2.30pm**

**Total Marks: 60**

## Instructions:

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

**Q.1** **(a)** A 4-cylinder, 4 stroke petrol engine has a stroke volume of 300cm$^3$ per cylinder. The engine is running at 3000rpm and developing 40KW output. Calculate (1) The air standard efficiency of engine cycle (2) rate of heat supplied (3) mean effective pressure. Assume the temperature and pressure of entering air 300K and 1 bar. **06**

**(b)** List disadvantages of conventional (battery & magneto) ignition system. Sketch a typical electronic ignition system with magnetic pickup. **06**

**Q.2** **(a)** Draw neat and labeled sketches of following valves used in IC engines. **06**

(1) poppet valve
(2) sleeve valve
(3) tulip valve
(4) reed valve

**(b)** Explain construction and purpose served by following piston design. **06**

(1) Of set piston
(2) Oil cooled piston
(3) Anodized piston

**OR**

**(b)** State function of vibration damper in automobile. Explain hydraulic damping with neat sketch. **06**

**Q.3** **(a)** Derive an expression to calculate air/ fuel ratio for simple carburetor neglect the compressibility of air. **06**

**(b)** A4-cylinder four stroke diesel engine develops a power of 30 KW at 3000rpm. The specific fuel consumption is 0.28 kg/ KWh fuel at 35° API. The fuel is injected at an average pressure of 160 bar. The duration of injection is 28 ° of crank travel. The pressure in the combustion chamber is 35 bar. The coefficient of velocity is 0.92. determine the velocity of injection of the fuel and diameter of fuel orifice. **06**

**OR**

**Q.3** **(a)** A four stroke spark ignition engine with 80mm bore and 90 mm stroke at 4000rpm and uses a fuel having 84% carbon, 16% hydrogen by mass. The volumetric efficiency of the engine at that speed is 80%. The ambient condition are pressure =0.1bar, temperature=0.25 °C, the depression at venture throat is 0.06 bar. The actual quantity of air supplied is 0.95 of stoichiometric value. Calculate the fuel flow rate, the air velocity at throat and throat diameter. R(fuel vapour) =98 J/kg K, R(air)=287 J/kg K. **06**

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| | **(b)** | Define spray dispersion? What are the important factors that affect the dispersion of fuel in combustion chamber of a CI engine? | **06** |
| **Q.4** | **(a)** | State recent developments in IC Engines with reference to future fuels. | **06** |
| | **(b)** | Describe with help of neat diagram operating principle of jet ignition stratified charge engine. | **06** |

**OR**

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|---|---|---|---|
| **Q.4** | **(a)** | Describe principle of multipoint injection system with neat sketch. | **06** |
| | **(b)** | Discuss design principles of low heat rejection engine. | **06** |
| **Q.5** | **(a)** | Draw circuit diagram for a flashing light indicating system? Describe construction and working of its flasher unit. | **06** |
| | **(b)** | Explain the following<br>(1) Aspect ratio of a tyre<br>(2) Low profile inflated tyre<br>(3) Under inflated tyre | **06** |

**OR**

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| **Q.5** | **(a)** | State various troubles occurring in starting system their probable causes and remedies. | **06** |
| | **(b)** | A cielo GLE car has a wheel base of 2520mm and pivot center of 1100mm. the front and rear wheel tracks are 1400mm each. If the inside lock angle is 43 ° determine<br>(1) Correct outside lock angle<br>(2) maximum and minimum turning circle radius. | **06** |

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