Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 161902 **Date: 23/11/2011**
Subject Name: Internal combustion Engine
Time: 10.30 am -1.00 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) Calculate the percentage change in efficiency of air standard Otto cycle having a compression ratio of 7 for the following cases **07**
(i) The specific heat at constant increases by 2 %
(ii) The specific heat at constant pressure increases by 2 % assuming γ =to be invariant

(b) What do you mean by air standard cycle? List assumptions for air standard cycle and list causes of departure of actual diesel cycle from ideal. **07**

Q.2

(a) Draw neat and labeled diagram of multi point fuel injection system for modern automobile engines and explain its working. **07**

(b) With neat sketch explain working principle and constructional detail of Bosch fuel injection pump. **07**

OR

(b) State and explain engine design and operating modifications to be made in Spark ignition engine to minimize pollution. **07**

Q.3

(a) List advantages and disadvantages of constant pressure turbo charging. **07**

(b) What do you understand by ignition timings? Discuss the various factors which affect ignition timing requirements. **07**

OR

Q.3 (a) State effect of supercharging on following parameters **07**
(i) Power ourput
(ii) Mechanical efficiency
(iii) Fuel consumption

(b) State function of following in stirling engine **07**
(i) Power piston
(ii) Buffer space
(iii) Swashplate drive

Q.4

(a) What are basic requirements of good spark ignition engine combustion chamber and general principles of spark ignition combustion chamber **07**

(b) Compare performance of SI and CI engines with respect to following variables **07**
(i) Power output per unit weight
(ii) Acceleration

(iii) Power output per unit piston displacement

OR

Q. 4 (a) Describe with suitable sketches the combustion phenomena in spark ignition engine and explain the phases of combustion. **07**

(b) Explain how induction swirl is created? What are requirements of injector with this type of swirl? **07**

Q.5

(a) The following observations were recorded from test on a single cylinder four stroke oil engine cylinder bore =150mm, engine stroke =250mm engine speed 420rpm, brake torque=217Nm, fuel consumption 2.95 kg/h, calorific value of fuel=44000KJ/Kg cooling water flow rate=0.068Kg/s, cooling water temperature rise=45K, specific heat capacity of cooling water=4.18KJ/kg k, Mean effective pressure=7.5 bar, calculate(a) mechanical efficiency(b) brake thermal efficiency,(c) specific fuel consumption (d) draw heat balance sheet **07**

(b) Write brief note on Wankle Engine. **07**

OR

Q.5 (a) A six cylinder four stroke CI engine developing a power output of 270KW at 1000rpm has a fuel consumption of 0.25kg/KWh. The injection takes place over 20° crank angle with pressure across the injector orifice of 100MPa, calculate rate of fuel injection in mg/s through each hole of four hole injection fitted in the engine cylinders and thermal efficiency of the engine. **07**

(b) Write brief notes on: Euro Norms and Testing of IC engine as per IS. **07**

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