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Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Automotive Fuels and Combustion

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Briefly explain the structure of crude petroleum groups, with two example each. **(10 Marks)**

b. With a neat block diagram, explain refining process of petroleum. **(10 Marks)**

2 a. Explain analysis of flue gases by Orsat apparatus, with neat sketch. **(10 Marks)**

b. The volumetric analysis of exhaust gases from a petrol engine as follows :
$CO_2 = 14.4\%$; $O_2 = 3.3\%$; $CO = 0.4\%$; $N_2 = 79.7\%$.
Determine percentage of excess air by weight. **(10 Marks)**

3 a. Explain with neat sketch, construction and working of H2 , Fuel cell used in Automotive vehicle. **(10 Marks)**

b. Write short notes on the following : **(10 Marks)**
i) Solar powered vehicle ii) Synthetic fuel.

4 a. "Natural gas burns cleaner than Diesel". Justify this statement with correct reason. **(03 Marks)**

b. Explain production process Bio – diesel and list the advantages and disadvantages of Bio diesel as automotive fuel. **(07 Marks)**

c. The following data were recorded during a test on single cylinder four stroke engines.
Bore = 150mm ; Stroke = 300mm ; Speed = 300 rpm
Brake Torque = 200N-m ; Fuel consumption = 204 kg/hr.
Indicated Mean effective pressure = 7 bar ;
Cooling water flow rate = 5kg/min ; Air fuel ratio = 22 : 1 ;
Cooling water Temp. raise = 30^0C ; Room Temperature = 22^0C ;
Exhaust gas temperature = 410^0C ; Calorific value of fuel = 42000kJ/kg , specific heat of coolant water = 4.186kJ/kg^0 K. Specific heat of exhaust gas = 1.0 kJ/K^0 K.
Determine : i) Mechanical efficiency ii) BSFC iii) Draw Heat Balance sheet on minute basis. **(10 Marks)**

PART – B

5 a. What are the factors considered for fuel – air cycle analysis and also mention the assumptions? **(04 Marks)**

b. Derive an expression of air standard efficiency for constant pressure cycle with P-V and T-S diagram. **(10 Marks)**

c. In an air standard Otto cycle, the compression ratio is 7 and the compression begins at 35^0C and 0.1 MPa. The maximum temperature of the cycle is 1100^0C. Find
i) Temperature and the pressure at various points in cycle ii) The Heat supplied per kg of air iii) The cycle efficiency. **(06 Marks)**

6 a. Define knocking in S.I. Engine. Explain the effect of compression ratio, Engine speed, Inlet temperature on knocking with suitable graph. **(10 Marks)**

b. What are the basic requirements of good combustion chamber in S.I. Engine? **(04 Marks)**

c. Briefly explain the stratified charge combustion. **(06 Marks)**

7 a. Explain with Pressure Vs Crank Angle (P-θ) diagram, combustion in C.I. engine. **(10 Marks)**

b. What is Swirl? Name the methods of generating air swirl in Diesel engine. **(04 Marks)**

c. What is delay period? Explain the factors affecting delay period in Diesel Engine combustion. **(06 Marks)**

8 a. What are the modification required to use CNG as fuel in Diesel Engine? **(06 Marks)**

b. List the advantages of Dual Fuel Engine. **(04 Marks)**

c. What is Multifuel Engine? With suitable graph, explain performance of Alcohol as multifuel in Diesel Engine. **(10 Marks)**

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