CBCS SCHEME
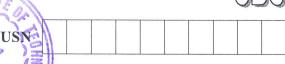
Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Automotive Fuels and Combustion

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List out the Non-Conventional sources of energy sources. Explain any two with a neat sketch. **(10 Marks)**
   b. Write short notes on:
      i) Bio-Energy
      ii) Synthetic Fuels. **(10 Marks)**

OR

2 a. Give the general formula of the following fuels:
      i) Paraffin   ii) Defius   iii) Napthene   iv) Aromatic. Also state their molecular Arrangements and mention whether they are saturated or unsaturated. **(10 Marks)**
   b. Explain with a neat sketch, the refining process of petroleum. **(06 Marks)**
   c. List the various properties of liquid fuels. Explain any two. **(04 Marks)**

Module-2

3 a. Explain the working of Orsat Apparatus with a neat sketch. **(10 Marks)**
   b. Explain the production process of Bio diesel. List out the advantages and disadvantages of Biodiesel. **(10 Marks)**

OR

4 a. Explain the Flue gas analysis by gas chromatography. **(10 Marks)**
   b. Find the stioidimetric Air-fueld ratio for the combustion of Ethyl alcohol C_2H_6O in a petrol engine. Calculate the Air-fuel ratio for a mixture strength of 80% and determine the wet and dry analysis by volume of exhaust gas. **(10 Marks)**

Module-3

5 a. Discuss the effect of the following variables on flame propogation:
      i)   Fuel-Air Ratio
      ii) Compression Ratio
      iii) Load
      iv) Turbulence
      v)   Engine speed. **(10 Marks)**
   b. What are the basic requirements of a combustion chamber in S.I. Engine? **(04 Marks)**
   c. List the different types of combustion chamber. Explain any one with a neat sketch. **(06 Marks)**

OR

6 a. Discuss the various stages of combustion in C.I. engine with a neat P-θ diagram. **(10 Marks)**
   b. Explain briefly 'Stratified charge' combustion. **(06 Marks)**
   c. Write the difference between Swirl and Squish in combustion of CI engines. **(04 Marks)**

Module-4

7 a. A six cylinder gasoline engine operates on four stroke Otto cycle. The bore of each cylinder is 80mm and the stroke is 100mm. The clearance volume per cylinder is 70CC. The fuel consumption is 5.5 kg/sec (or 19.8kg/hr) and the torque developed is 160NM at 4100rpm. Calculate:

   i)   Brake power
   ii)   Brake mean effective pressure
   iii) Brake thermal efficiency if the C.V. of the fuel is 44000 kJ/kg
   iv)   Relative efficiency. **(12 Marks)**

   b. Briefly explain the following terms:
   i)   Mechanical efficiency
   ii)   Volumetric efficiency
   iii) Brake specific fuel consumption
   iv)   Indicated power. **(08 Marks)**

OR

8 a. Explain the method to find frictional power using Morse Test. **(08 Marks)**

   b. The following data were recorded during a test on single cylinder four stroke engine. Bore = 150mm; stroke = 300mm; speed = 300rpm; Brake torque = 200Nm; Fuel consumption = 204kg/hr; Indicated Mean effective pressure = 7 bar; Cooling water flow rate = 5kg/min; Air fuel ratio = 22%; Cooling water temperature raise = 30°C; Room temperature = 22°C; Exhaust gas temperature = 410°C; Calorific value of fuel = 42000kJ/kg; specific heat of cooling of water = 4.186 kJ/kg-K; Specific heat of exhaust gas = 1.0 kJ/kg-K. Determine:

   i)   Mechanical efficiency
   ii)   BSFC
   iii) Draw Heat balance sheet on Minute Basis. **(12 Marks)**

Module-5

9 a. What is meant by dual/Multifuel Engine? **(06 Marks)**
   b. Mention the requirements of Multifuel engines. **(04 Marks)**
   c. What are the Modifications required to use CNG as fuel in diesel engine? **(10 Marks)**

OR

10 a. Discuss the working of a dual fuel engine. State its advantages and disadvantages. **(10 Marks)**
   b. Discuss any four factors affecting combustion in dual fuel engine. **(10 Marks)**

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