B.E. Second Semester (Fire Engg.) (C.B.S.)
Materials Chemistry Paper – III

P. Pages : 2

Time : Two Hours

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Max. Marks : 40

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Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Due credit will be given to neatness and adequate dimensions.
7. Diagrams and chemical equations should be given whenever necessary.
8. Illustrate your answers wherever necessary with the help of neat sketches.
9. Use of non-programmable calculator is permitted.

1. a) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were recorded: **4**
   i) Volume of gaseous fuel burnt at NTP = 0.093 m^3.
   ii) Weight of water used for cooling the combustion products = 31.0kg.
   iii) wt of steam condensed = 0.030 kg.
   iv) Temperature of inlet water = 26.2°c
   v) Temperature of Outlet water = 36.3°c.
   Determine G.C.V. and N.C.V. of gaseous fuel per cubic meter at NTP.

   b) Explain the determination of calorific value of solid and non volatile liquid fuel by using Bomb calorimeter. **6**

OR

2. a) What are rocket propellants? Give the characteristics of propellants. **3**

   b) What is significance of proximate analysis of coal? **3**

   c) Write short notes on: **any two.** **4**
   i) C.N.G.
   ii) L.P.G.
   iii) Biodiesel.

3. a) A liquid hydrocarbon fuel containing C=80% and H=20% is fired in a furnace. Calculate:
   i) Weight of air required per kg of fuel.

   4
   ii) The volumetric composition of dry products of combustion, if 30% excess air is used. **4**

   b) Explain Fischer Tropsch Process for manufacturing of synthetic gasoline with a well labelled diagram. **4**

OR

4. a) Explain the process of fractional distillation of crude oil with a well labeled diagram. What are the different fractions of petroleum and their uses? **6**

b) Explain knocking in petrol Engine. How is it related to chemical structure of fuel. **4**

c) Differentiate between octane number and Cetane number. **2**

5. a) Under what operating conditions solid lubricants are preferred? Explain Graphite as a solid lubricant with diagram. **5**

b) Give the significance of following properties of lubricating oils: **3**
   i) Cloud and pour point
   ii) Aniline point
   iii) Acid value.

OR

6. a) Explain thick film lubrication. **3**

b) Write criteria for selection of lubricants for. **3**
   i) Transformer.
   ii) IC Engine.
   iii) Steam turbine.

c) A lubricating oil has the same viscosity as standard napthanic and paraffinic type oils at 210ºF. Their viscosities at 100ºF are 325 S.U.S., 430 S.U.S. and 260 S.U.S. respectively. Find the viscosity Index of the oil. **2**

7. a) What are nanomaterials? Enlist the applications of nanomaterials in the field of Electronics. **3**

b) What are the properties and applications of liquid crystal polymers? Discuss different phases of LCP. **4**

c) What are biodegradable polymers? Give synthesis and applications of polylactic acid. **3**

OR

8. a) What are composite materials? Give industrial applications of fibre reinforced composite materials. **3**

b) Give an account of synthesis, properties and applications of polypyrole as a conducting polymer. **4**

c) Differentiate between single wall carbon nanotube and multi wall carbon nanotube. **3**

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