B.E. Second Semester (C.B.S.) / B.E. Second Semester (Fire Engineering)

Materials Chemistry Paper - III

P. Pages : 2 **KNT/KW/16/7204**

Time : Two Hours * 0 0 8 6 * Max. Marks : 40

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 whenever necessary with the help of neat sketches.
9. Use of non programmable calculator is permitted.
10. Discuss the reaction, Mechanism wherever necessary.

1. a) Calculate G.C.V. and N.C.V. of a gaseous fuel at S.T.P. from following data obtained during Boy's calorimeter experiment : **4**

Vol. of gaseous fuel burnt at STP = $0.093 m^3$
Weight of water used for cooling = 23.5 kg
Weight of steam condensed = 0.39 kg.
Temperature of inlet water = 24.1ºC
Temperature of outlet water = 33.8ºC
Latent Heat of water vapour condensed = 540 kcal/kg.

b) Discuss the significance of ultimate analysis of coal. **3**

c) Describe the principles of Rocket Propulsion. **3**

OR

2. a) Explain determination of calorific value of a solid fuel by using Bomb Calorimeter. **4**

b) Write informative notes on **any two :** **6**
i) Biodiesel
ii) Solar Energy
iii) Classification of Rocket Propellants

3. a) A coal sample has following composition
C = 62.4%, H = 4.1%, O = 6.9%
N = 1.2%, S = 0.8%, Moisture = 15.1%
and Ash = 9.5%
Calculate :
i) Minimum air required in m^3 at NTP for 1kg of this sample. **4**

ii) q_0 composition of dry products by volume if 45% excess air is supplied. **4**

b) Explain Fischer Tropsch Process for manufacturing of synthetic gasoline. **4**

OR

4. a) What is Compression ratio? How does it affect the power output and efficiency of internal combustion engine? **3**

b) What is catalytic cracking? Explain fluid bed catalytic cracking with a neat labeled diagram. **5**

c) Write short note on **any two :** **4**

i) Cetane number.

ii) Antiknocking agents in petrol.

iii) Advantages of catalytic cracking over thermal cracking.

5. a) What are greases? State the conditions under which they are used. **3**

b) Give significance of following : **2**
1) Flash & fire point
2) Cloud & Pour point

c) A Lubricating oil has the same viscosity as standard naphthenic and paraffinic type oils at 210ºF. Their viscosities at 100ºF are 350 SUS, 480 SUS and 230 SUS respectively. Find the viscosity index of the oil. **3**

OR

6. a) Explain mechanism of Boundary Lubrication. **3**

b) What are the requisites of lubricants to be used in following machinery : **3**
1) Refrigeration
2) Steam Turbine
3) IC engine.

c) Explain Graphite as solid lubricant. **2**

7. a) What are conducting polymers? Explain synthesis, properties and applications of Poly pyrrole. **4**

b) State general properties and applications of Liquid Crystal Polymers. **3**

c) Give synthesis and application of Polylactic acid as a biodegradable polymer. **3**

OR

8. a) Give an account of applications of nanomaterials in Medicine and Environment. **4**

b) What are Carbon nanotubes? Explain its types. **3**

c) Write the classification and application of composite materials. **3**

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