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

Materials Chemistry

P. Pages : 2 **NRT/KS/19/3289/3943**

Time : Two Hours * 0 5 7 5 * 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. Assume suitable data whenever necessary.
7. Diagrams and chemical equations should be given whenever necessary.
8. Use of non programmable calculator is permitted.

1. a) A sample of coal containing 5.5% of hydrogen, when tested in Bomb calorimeter following data were recorded. **4**

Weight of coal taken	1.5 gm
Weight of water taken in calorimeter	2250 gm
Water equivalent of calorimeter	550 gm
Rise in temperature of water	2.59ºC
Cooling correction	0.02ºC
Fuse wire correction	15 Cals
Acid correction	25 Cals

Calculate Gross and Net Calorific values of the coal presuming that latent heat of steam is 580 cal/gm

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

c) Discuss composition, properties and uses of L. P. G. **3**

OR

2. a) Describe construction and working of Bomb calorimeter. **4**

b) Write informative notes on **any two.** **6**
i) CNG
ii) Biodiesel.
iii) Geothermal Energy.

3. a) A coal sample an analysis give following composition :
C - 75%, H - 6%, O - 1.6%, S - 1.6%, N - 1%, moisture - 1.8% and rest is ash.
Calculate –
i) Minimum volume of air at NTP required for the combustion of 200 kg of this coal. **4**

ii) Volumetric composition of dry flue gas when 20% excess air is supplied for combustion. **4**

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

OR

4. a) What is catalytic cracking? Explain fluid bed catalytic cracking with a neat sketch. **4**

b) Write short notes on. **4**
i) Knocking in petrol engine.
ii) Biodegradable lubricants.

c) Explain octane number and its relationship with the chemical structure of hydrocarbons present in the fuel. **4**

5. a) Define viscosity and viscosity index? How these properties of lubricating oil can be improved? **4**

b) Distinguish between thick film and thin film mechanisms of Lubrication. **2**

c) Write a note on synthetic lubricants. **2**

OR

6. a) Discuss the properties of lubricating oil used for I. C. engines and transformers. **4**

b) Under what conditions are semisolid lubricants used? **2**

c) Write short note on **any two.** **2**
i) Acid value.
ii) Flash point
iii) Aniline point.

7. a) What are composite materials? How are they classified? Give industrial applications of composite materials. **4**

b) Explain properties and applications of polycaprolactone (PLC). **4**

c) Write applications of polylactic acid. **2**

OR

8. a) What are Nano materials? Give applications of Nano materials in the field of medicine and environment. **4**

b) What are carbon Nanotubes? Explain the single walled and multiwalled carbon nanotubes? **3**

c) Write general properties and applications of liquid crystal polymers. **3**

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