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

Materials Chemistry

P. Pages : 2

Time : Two Hours

| | *0763* | |

NJR/KS/18/4344/5001

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. Assume suitable data whenever necessary.
8. Diagrams and chemical equations should be given whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. a) The following data was obtained in a Bomb calorimeter experiment:- **4**
    Weight of coal burnt = 1.90g
    Water equivalent of colorimeter = 500g
    Weight of water taken in calorimeter = 2600g
    Initial temperature of water = 25.05ºC
    Final temperature of water = 29.80ºC
    Acid correction = 8 Cal
    Fuse wire correction = 5 Cal
    Cooling correction = 0.25ºC

If the coal contains 6.7% Hydrogen, calculate GCV and NCV of coal provided that the latent heat of steam condensed is 584 Cal/g.

b) Write short note on **any two.** **6**
  i) Classification of Rocket Propellants.
  ii) Biodiesel.
  iii) Significance of ultimate analysis of coal.

OR

2. a) Describe the calorific value determination of a gaseous fuel by Boy's calorimeter. Explain your answer with suitable diagram. **4**

b) Write short notes on **any two:** **6**
  i) CNG
  ii) LPG
  iii) Solar energy

3. a) The coal containing C = 76%, H = 5%, O = 3.5%, N_2 = 3%, S = 1.5% and remaining ash is fired in a furnace. Calculate:
  i) Theoretical quantity of air required per kg of coal burnt. **4**

  ii) If 45% excess air is used calculate volumetric composition of dry products of combustion. **4**

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

<div align="center">

OR

</div>

4.	a)	Explain the process of fractional distillation of crude oil with a well labelled diagram & different fractions obtained with their uses.	**5**
	b)	What is cracking? Describe fluid bed catalytic cracking with a neat labeled diagram.	**4**
	c)	Define octane number. State how knocking in petrol is related with its chemical structure.	**3**
5.	a)	What are semisolid lubricants? Under what conditions are semi-solid lubricants preferred?	**3**
	b)	Give the significance of: i) Viscosity and viscosity Index. ii) Cloud point and pour point. iii) Drop point test of greases.	**3**
	c)	A Lubricating oil has same viscosity as that of high viscosity standard and low viscosity standard oil at 210ºF. Their viscosities at 100ºF are 320 sec, 280 sec and 420 sec respectively. Find viscosity Index of the oil.	**2**

<div align="center">

OR

</div>

6.	a)	Discuss Boundary Lubrication on mechanism.	**3**
	b)	Under what operating conditions are solid lubricants preferred? Explain role of graphite as solid lubricant.	**3**
	c)	What are the requisites of lubricants to be used in following **any two.** i) Transformer. ii) I/C engines iii) Gear	**2**
7.	a)	What are Biodegradable polymers? Give synthesis & applications of poly lactic acid.	**4**
	b)	Write short notes on **any two.** i) Applications of nanomaterials in environment. ii) Conducting polymers iii) Carbon nanotubes	**6**

<div align="center">

OR

</div>

8.	a)	What are composite materials? How are they classified? Write any two industrial applications of them.	**4**
	b)	Write short notes on **any two.** i) Liquid crystal polymers. ii) Properties & applications of polyaniline iii) Applications of nanomaterials in medicine.	**6**

<div align="center">

****

</div>