VRK/KS/14/6556

Faculty of Engineering & Technology
Second Semester B.E. (C.B.S.) Examination
MATERIALS CHEMISTRY
Paper—III–BESII–3T

Time—Two Hours] [Maximum Marks—40

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve **FOUR** questions as follows :
Que. No. 1 **OR** Que. No. 2
Que. No. 3 **OR** Que. No. 4
Que. No. 5 **OR** Que. No. 6
Que. No. 7 **OR** Que. No. 8

(3) Due credit will be given to neatness and adequate dimensions.

(4) Assume suitable data wherever necessary.

(5) Diagrams and Chemical equations should be given wherever necessary.

(6) Illustrate your answers wherever necessary with the help of neat sketches.

(7) Discuss the reaction, mechanism wherever necessary.

(8) Use of non-programmable calculator is permitted.

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

(i) Volume of gaseous fuel burnt at STP = $0.085 m^3$.

(ii) Wt. of water used for cooling the combustion products = 29.6 kg

(iii) Wt. of steam condensed = 0.028 kg

(iv) Temperature of inlet water = $20.6^{\circ}C$

(v) Temperature of outlet water = $33.4^{\circ}C$

Latent Heat of water vapours condensed = 540 kcal/kg is to be assumed. 4

(B) Discuss the significance of Ultimate Analysis of coal. 3

(C) Discuss the various corrections applied during determination of calorific value of solid fuel by Bomb calorimeter. 3

OR

2. (A) What are Rocket propellants ? How the chemical rocket propellants are classified ? 4

(B) Write short notes on (any **TWO**) :

(i) Biodiesel

(ii) C.N.G.

(iii) Solar Energy. 6

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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.

(ii) The volumetric composition of dry products of combustion, if 20% excess air is used. 4+4

(B) Give the various fractions obtained boiling pointwise on fractional distillation of crude oil. Also mention their uses. 4

OR

4. (A) What is Catalytic cracking ? Mention important advantages of catalytic cracking. Explain fluid bed catalytic cracking with a neat sketch. 6

(B) Write short notes on :

(i) Knocking in diesel engine

(ii) Antiknocking agents in petrol. 6

5. (A) Differentiate between Thick film and Thin film mechanisms of lubrication. 3

(B) Under what operating conditions are solid lubricants preferred ? Explain role of graphite as a solid lubricant. 3

(C) 'Closed cup apparatus gives more reliable and accurate values of flash and fire point than obtained by open cup apparatus'. Justify. 2

OR

6. (A) Give the significance of following properties of lubricating oils :

(i) Viscosity Index

(ii) Aniline point

(iii) Cloud and pour point. 3

(B) Write short notes on (any **TWO**) :

(i) Lubricating emulsions

(ii) Drop point test

(iii) Biodegradable lubricants. 5

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

(B) Enlist the applications of Nanomaterials in the fields of medicine and environment. 4

(C) What is Carbon Nanotube ? Name its types. 2

OR

8. (A) What are conducting polymers ? Give properties and applications of polyaniline. 3

(B) Give an account of synthesis, properties and applications of polylactic acid, a biodegradable polymer. 4

(C) What are Liquid Crystal Polymers ? Give different phases of liquid crystal polymers. 3