



- x. Setting and hardening of cement involves (a) hydrolysis and neutralization (b) hydration and neutralization (c) hydration and hydrolysis (d) dehydration and hydrolysis.
- xi. The synthesis of which of the following polymers require the loss of water molecules on a regular basis? (a) Polythene (b) Buna-N (c) Nylon-6,6 (d) Buna-S
- xii. The chemical added to detect leakage from LPG cylinder is (a) TEL (b) iso-octane (c) iso-butane (d) ethyl mercaptan
- xiii. The amount of electricity required to produce 12 gm of  $O_2$  at respective electrode from acidulated water is— (a) 1 F (b) 2 F (c) 1.5 F (d) 0.5 F
- xiv. Oxidation number of O in  $H_2O_2$  is (a) -2 (b) +2 (c) -1 (d) +1
- xv. Octane number of petrol is calculated considering the percentage of (a) Isoprene (b) iso-octane (c) n-hexadecane (d) iso-butane.

#### GROUP-B

2. (a) How hydrogen atomic spectra can be explained from Bohr model?  
 (b) State Hund's rule of maximum multiplicity and explain it with proper example.  
 (c) Find all the quantum numbers of the last two electrons of  $O^{2-}$  ion. (2+3+3)
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3. (a) Explain why ethyl alcohol has higher boiling point than dimethyl ether though they have same molecular formula.  
 (b) Mention two structural differences between graphite and diamond.  
 (c) Hybridisation of N is same in both  $NH_4^+$  ion and  $NH_3$  molecule although geometry of  $NH_4^+$  ion is regular tetrahedral but  $NH_3$  molecule is distorted tetrahedral. Explain why? (3+2+3)
4. (a) Why hard water does not produce lather easily on mixing with soap?  
 (b) Write down the principal and chemical reaction involved in resin process of softening of hard water.  
 (c) An exhausted zeolite softner was regenerated by carefully passing 117 litres of NaCl solution having strength 50 gm/lit of NaCl. If hardness of water is 500 ppm, calculate the total volume of water softened by this softner. [Given; Mol.Wt. of NaCl and  $CaCO_3$  are 58.5 and 100 respectively.] (2+3+3)



5. (a) Explain with chemical reaction setting and hardening of Portland cement.  
(b) Classify lubricants with proper example.  
(c) Explain the statement- 'octane number of a sample gasoline is 60'.

(3+3+2)

6. (a) Define calcinations and roasting.  
(b) Why cryolite is added during extraction of Al from  $\text{Al}_2\text{O}_3$ ?  
(c) State the composition of producer gas and bio gas.  
(d) What is vulcanisation of rubber?

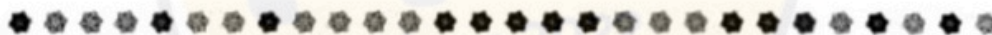
(2+2+2+2)

7. (a) Mention the reaction occurring in blast furnace during iron extraction.  
(b) Explain electrolytic refining of copper metal.  
(c) Describe the principal of cathodic protection.

(3+3+2)

8. (a) A current of 2.5 A is passed through two electrolytic cells containing  $\text{ZnSO}_4$  and  $\text{NiSO}_4$  solution for an hour. Find the ratio of the masses of zinc to nickel deposited at the respective electrodes. [At. Wt. of Zn and Ni are 65 & 59 respectively].  
(b) Establish the relation between equivalent weight and electrochemical equivalent weight.  
(c) Mention the electrodes used in a dry cell and write down the chemical changes take place at different electrodes in a dry cell?

[3+2+(1+2)]



9. (a) Calculate the pH of  $10^{-8}$  (M) HCl solution.  
(b) What is buffer solution? Give one example of acidic buffer.  
(c) A high strength brass alloy consists of 70% Cu, 25% Zn and 5% Fe.  
Find the mole fraction of each metal component.  
[Assume Mol Wt. Of Cu, Zn & Fe are 63.5, 65 and 56]

[3+(1+1)+3]