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SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E/B.Tech-All Branches

Title of the Paper: Engineering Chemistry

Max. Marks: 80

Sub. Code: 6C0072 (2007/08/09)

Time: 3 Hours

Date: 04/12/2010

Session: FN

PART - A (10 X 2 = 20)

Answer ALL the Questions

1. Give a chemical test to distinguish hard water and soft water.
2. Write the principle behind the estimation of hardness of water by EDTA method.
3. What will happen when an iron nail is immersed in to copper sulphate solution? Given that:
 $E^{\circ}_{Fe^{2+}/Fe} = -0.44V$ and $E^{\circ}_{Cu^{2+}/Cu} = +0.34V$.
4. Write down the cell reaction and calculate the emf of the following cell: $Ni_s / Ni^{2+}(1M) // Cu^{2+}(1M) / Cu(s)$
Given that : $E^{\circ}_{Ni^{2+}/Ni} = -0.24V$ and $E^{\circ}_{Cu^{2+}/Cu} = +0.34V$.
5. Bolt and nut made form same metal are preferred in practice – Give reason.
6. State and explain Pilling – Bedworth rule.
7. What do you mean by ‘oxygen balance’ of an explosive? Give its significance.

8. What is RDX? How is it prepared?
9. What is meant by LD₅₀ value of a toxicant?
10. How is *Chinese Restaurant Syndrome* caused?

PART – B (5 x 12 = 60)

Answer ALL the Questions

11. (a) Describe the demineralization process for softening of hard water. What are its advantages over zeolite process?
(b) Calculate the carbonate and non-carbonate hardness of a sample of water containing dissolved solids (mg/l) given as follows: Mg(HCO₃)₂ – 7.3; Ca(HCO₃)₂ – 40.5; CaSO₄ – 13.6; MgCl₂ – 21.75 and NaCl – 60.
(or)
12. (a) Discuss in detail the different steps involved in the potable water treatment process. (8)
(b) With the help of a neat diagram explain the reverse osmosis process for desalination.
(4)
13. (a) What are reference electrodes? Describe the construction and working of saturated calomel electrode with a neat diagram.
(b) Explain the potentiometric method for determination of emf of an electrochemical cell.
(or)
14. (a) What are concentration cells? What are their types? Derive an expression for calculating the emf of an electrolyte concentration cell. (8)
(b) Explain the principle behind the potentiometric titration between ferrous ion solution and potassium dichromate. (4)
15. (a) Explain the electrochemical theory of corrosion giving its mechanism.

(b) Describe the process of electroplating for making metal coating. List out the factors that are influencing the electroplating process.

(or)

16. (a) Write brief notes on:

(i) Impressed current cathodic protection

(ii) Corrosion inhibitors

(b) What is the principle behind the electroless plating technique? Discuss the different steps involved in nickel electroless plating.

17. (a) What are explosives? How are they classified?

(b) Explain the different types of liquid propellants using suitable examples.

(or)

18. (a) Describe the chemical composition, preparation and decomposition reaction of the following explosives:

(i) Gun powder

(ii) Mercury fulminate

(b) What are rocket propellant? What are the requirements for the proper selection of a propellant?

19. (a) Enumerate the biochemical effects of lead with reference to its source, pathways in environment and impact on human. Suggest a suitable antidote for lead poisoning.

(b) Write brief notes on the following food additives:

(i) Anti-oxidants

(ii) Sequestrants

(iii) Natural supplements

(or)

20. (a) Explain biochemical effect of carbon monoxide. (4)

(b) Critically analyze the risk associated with the following food additives:

(i) BHA and BHT

(ii) Diethyl pyrocarbonate

(5+3 = 8)

