K1 Level

1. Which of the following forms of electrochemistry seeks to obtain the condition of full polarization?

a) Potentiometry b) Voltammetry c) Coulometry **d) Electrogravimetry**

2. Which of the following methods is the widely used method for trace gas analysis?

a) Galvanic methods b) Conductometric method **c) Polarographic cells** d) Thermal conductivity method

3. Choose the correct order of molar ionic conductivities of the following ions.

a) $Li^+ < Na^+ < K^+ < Rb^+$ **b) $Li^+ < K^+ < Rb^+ < Na^+$** c) $Li^+ < Na^+ < Rb^+ < K^+$ d) $Li^+ < Rb^+ < Na^+ < K^+$

4. Which of the following cell is not rechargeable?

a) Lead storage battery b) Silver oxide cell c) Fuel cell d) Ni-Cd cell

5. Which of the following element act as inert electrode?

a) Cu **b) Ag** c) Pt d) None

6. Which of the following reactions occur at cathode?

a) $Cu^{2+} + 2e^- \rightarrow Cu$ b) $Cu + 2e^- \rightarrow Cu^{2+}$ **c) $Hg+O_2 \rightarrow HgO$** d) $Mg+O_2 \rightarrow MgO$

7. Zn(s)/Zn+2(aq) 1M ‖Cu+2(aq) 1M/Cu(s) is representation of reaction in

a) Daniel cell b) Downs cell c) Voltaic cell d) Nelsons cell

8. Which chemical used in salt bridge

a) KOH b) KCl **c) KNO_3** d) KBr

9. List of elements based on hydrogen scale is called

a) Periodic table **b) groups** c) Periods d) Electrochemical series

10. What is the Zn reduction potential value?

a) 0.76 b) -0.76 c) -0.55 **d) 0.55**

11. Which of the following factor is related to electro refining method volume (or) quantity?

a) Amperes b) Volts c) Temperature d) a&b

12. Which electroplating is more expensive in electroplating operation?

a) Au b) Ni c) Sn d) Mn

13. When electroplating nickel with silver, which one of the following equations represents what happens at the cathode?

a) $Ni \rightarrow Ni^{2+} + 2e^-$ **b) $Ag^+ + e^- \rightarrow Ag$** c) $Ag \rightarrow Ag^+ + e^-$ d) $Ni^{2+} + 2e^- \rightarrow Ni$

14. When plating silver onto cutlery, which one of the following electrolytes would be the most suitable?

a) $CuSO_4$ b) Ag c) $ZnSO_4$ **d) $AgNO_3$**

15. Which of the following is not an example of a fuel cell?

a) Hydrogen-oxygen cell b) Methyl-oxygen-alcohol cell

c) Propane-oxygen cell **d) Hexanone-oxygen cell**

16. What is the charging of a lead-acid cell?

a) Its voltage increases b) its gives out energy

c) its cathode becomes dark chocolate brown in colour d) Specific gravity of H_2SO_4 decreases

17. Name of the storage battery generally used in electric power station is

a) Li-Cd battery b) Zinc-Carbon battery **c) Lead-Acid battery** d) None of the above

18. Which term expressed in the capacity of a battery?

a) current rating b) Voltage rating **c) Ampere-hour rating** d) All

19. List the life of the batteries in the following ascending order

a) Lead- Acid cell, Edison cell, Ni-Cd cell b) Lead- Acid cell, Ni-Cd cell, Edison cell

c) Edison cell, Ni-Cd cell, Lead- Acid cell d) Ni-Cd cell, Edison cell, Lead- Acid cell

20. Which of the following metals does not exist in nature in the form of?

a) Nitrates b) Sulphates c) Carbonates d) Oxides

21. What is meant by corrosion?

a) Chemical reaction between anode, cathode and electrolyte which leads to loss of metal

b) Determination of metals due to reaction with its environment

c) Both a & b d) None of the above

22. Which of the following is an example of corrosion?

a) Rusting of iron b) Tarnishing of Ag c) Liquefaction of ammonia

d) Rusting of iron and tarnishing of Ag

23. Which of the following is the most stable state of metal?

a) Ore of metal b) Pure metal c) Corroded metal d) Metal ion

24. Name of the dry corrosion is called

a) Chemical corrosion b) Electrochemical corrosion c) Wet corrosion d) Oxidation corrosion

K2 Level

1. What is cell constant? Give its unit.

2. What would be the value of degree of ionization for a strong electrolyte?

3. Why do we use a very small current during the determination of transport number?

4. Define degree of hydrolysis

5. What is the principle of precipitation?

6. What is an electrochemical cell?

7. Define reduction potential

8. What does Ag/Ag^+ (0.1M) ‖ Ag^+ (0.1M)/Ag constitutes a cell?

9. Define reference electrode

10. What is the composition of the salt bridge used between two half-cells?

11. How can electroplating be done?

12. What is electro deposition?

13. What is nickel plated steel?

14. Which metals are used in the electroplating process?

15. What are the categories of electroplating coating?

16. What is electro less nickel plating?

17. How long should a rechargeable last?

18. What is a fuel cell?

19. What is Lead-Acid accumulator?

20. Why is salt bridge used in the construction of a cell?

21. Why is NH_4NO_3 (or) KCl used for preparing salt bridge?

22. Why metals undergo corrosion? How is corrosion related to metallurgy? Give examples of corrosion of metals?

23. What is crevice corrosion?

24. What is cracking?

25. Define electrochemical protection.

26. What is hybrid coating?

K3 Level

1. Discuss the weak acid vs strong base by conductometric titration.
2. Explain the graph of strong acid vs strong base by conductometric titration.
3. Describe the diffusion limited current.
4. Analyse the adsorption currents.
5. Explain the kinetic currents.
6. Analyse the amperometric titrations.
7. Explain the principle of polarography.
8. Analyse the current- voltage relationship.
9. Discuss the chronoamperometry
10. Analyse the principle of coulometry.
11. Discuss about the divided and undivided cells.
12. Describe Kolbe synthesis.
13. Illustrate the three products of chlor-alkali cells.
14. Construct the Mercury cell.
15. Discuss the electrochemical cells.
16. Illustrate the diaphragm in electrochemistry.
17. Discuss the electro-inorganic chemicals.
18. Explain chlorates and per chlorates.
19. Compare electro-reduction of nitro and carbonyl groups.
20. Construct adiponitrile.
21. What are the advantages and disadvantages of electroplating?
22. Explain the history of electroplating?
23. Describe the electro winning.
24. Analyse the reefing of Cu and Ni.
25. Explain the electrolytic protection of Mg.

26. Discuss electroplating operations.

27. Explain the electroplating of chromium.

28. Analyse the metal plating.

29. Explain the function of salt bridge.

30. How does fuel cell differ from battery?

31. Discuss the working principle of primary batteries.

32. Explain the factors influencing emf of batteries.

33. Discuss briefly about i) Primary cell ii) Secondary cell.

34. Compare cell and battery. Give the classification of cells with examples.

35. Describe the construction and working of Leclanche cell.

36. Construct the Ni-Cd cells.

37. Explain charging and discharging.

38. Discuss the working principle of secondary batteries.

39. Distinguish corrosion potential and corrosion current. Which is more detrimental for corrosion?

40. Compare coating and painting.

41. Explain how corrosion affecting various industries.

42. Discuss the effect of corrosion

43. Describe the factors on which corrosion depends.

44. Discuss various methods of protection corrosion.

45. Explain sacrificial anodic and impressed current cathodic protection?

46. Explain the rusting of iron with the help of electrochemical theory of corrosion

47. Distinguish between anodic and cathodic protection methods

48. Discuss the characteristic features of paints and their functions.

K4 Level

1. Discuss about cyclic voltammetry.
2. Describe the following techniques given the below a) chronopotentiometry b) potentiometric titrations.
3. Explain conductometric titrations.
4. Discuss in detailed of limiting currents and its types.
5. Elaborate the principle and application of voltammetry and cyclic voltammetry.
6. Describe the current- voltage relationships.
7. Discuss the Components of electrochemical cells.
8. Describe the following cells i) mercury ii) membrane.
9. Explain the electro synthesis of fluorine.
10. Discuss in detailed study of the electrodimerisation.
11. Describe electro-organic chemicals with examples.
12. Discuss about the Hall-Heroult process.
13. Describe the following electroplating techniques given the below a) Nib) Cu
14. Explain anodizing of Al.
15. Discuss the electro production of Mg and Na.
16. Explain the history of electro winning.
17. Explain the construction and working of H_2-O_2 fuel cell? Write the reaction in valued.
18. Describe the working principle of high temperature batteries. Give some examples.
19. Construct Sodium-Sulphur system.

20. Describe the construction and working of Lithium cells.

21. Discuss the half cell reaction in batteries.

22. Explain chemical theory of corrosion.

23. Describe the bimetallic corrosion. Give examples.

24. Explain the pourbaix diagram.

25. What are the types of corrosion? Explain any four types.

26. Discuss about the paints.

27. Explain the types of metal coatings.