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RIZVI COLLEGE OF ARTS, SCIENCE AND COMMERCE

T.Y.B.Sc. (Sem VI)

CBCS (2024-25)

Chemistry-Paper V (Applied Component) Drugs and Dyes

Total Marks: 75 Marks

Time: 2 hr.30 min hours

N.B.: (1) All questions are compulsory.

(2) Figures to the right indicate full marks.

(3) Use of log table/ non-programmable calculator is allowed.

Q.1 Attempt any 3 out of 5

15M

- 1 What is Lipinski's rule of five? Explain Anticancer properties of Curcumin.
- 2 What are antibiotics? Give the class, structure, chemotherapeutic activity, uses and side effects of Amoxicillin
- 3 What is Malaria? Give structure, characteristic properties, uses and side effects of Chloroquine.
- 4 What are antifungal agents? Give synthesis and uses of Albendazole.
- 5 Give synthesis and uses of Fluconazole.

Q.2 Attempt any 3 out of 5

15M

- 1 What are amoebicides? Give synthesis, uses of metronidazole.
- 2 What is tuberculosis? Give synthesis and uses of Ethambutol.
- 3 What is cancer and what are its causes.
- 4 What is meant by AIDS and HIV? Give structure and uses of Zidovudine (AZT).
- 5 Explain vitamin therapy.

Q.3 Attempt any 3 out of 5

15M

- 1 Give synthesis and uses of Eriochrome Black T from  $\beta$ -Naphthol
- 2 Give synthesis and uses of Malachite green.
- 3 Give synthesis and uses of Indanthrene Blue from anthraquinone.
- 4 Write note on toxicity of food colors.
- 5 What is bioremediation? How textile and leather industry affecting environment with reference to water pollution.

Q.4 Attempt any 3 out of 5

15M

- 1 Give a brief account on biomedical uses of dyes.
- 2 What are requirements of dyes used as food colors? Give two examples with structure.
- 3 What are weakness and challenges which the dyestuff industry is facing in India?
- 4 Write note on dyes used as biological staining agents.
- 5 What are the characteristics of organic pigments?

Q.5A Multiple choice question (any 4 out of 7)

4M

- 1 ----are drugs which are used to kill eliminate the parasitic worms from the body  
a)Antimalarial b) Anthelmintic c) Antiviral d) All of above
- 2 Different Species of Plasmodium after entering human body attacks -----.  
a)WBC b)RBC c) Eosinophil d) Plasma
- 3 Tonner are coloured organic compounds ----- in pure form.  
a)Soluble b) Insoluble c) solid d)Liquid
- 4 ---- is used as DNA marker.  
a)Bromophenol Blue b) Crystal violet c) Sunset Yellow d) Saffron T
- 5 The physical process by which suspended solids are allowed to settle by gravity is called----  
a)Coagulation b) Flocculation c) Precipitation d) Oxidation
- 6 The adsorption of pollutants on biological materials is called ----  
a)Biodegradation b) Bioprocess c) Biosorption d) None
- 7 Indigo is an example of ----  
a)Dye b) Medicine c) Pigment d) All of above

B True or false (any 4 out of 6)

4M

- 1 A homologue series is a group of compounds that differs by  $\text{CH}_2$
- 2 Tuberculosis only affect lungs.
- 3 Tonner is obtained by adding inert substances to dyes.
- 4 Benzidine used as starting material for synthesis of Congo red.
- 5 Dyeing process is 100% efficient.
- 6 Pigment cannot be converted into a dye.

C Match the column (any 4 out of 6)

4M

- |                      |                              |
|----------------------|------------------------------|
| 1 Antibiotic         | a. Sorption                  |
| 2 Chloroquine        | b. Nitrobenzene              |
| 3 Monoazo dye        | c. 4-Amino quinoline         |
| 4 Congo red          | d. Orange IV                 |
| 5 Biodegradation     | e. Amoxicillin               |
| 6 Activated Charcoal | f. Breaking up of pollutants |

D Fill in the blanks (any 3 out of 6)

3M

(Cis-platin, Food Safety and Standard Authority of India, Triphenyl methane, tuberculosis, Albendazole, Eriochrome Black T, Gram positive bacteria)

- 1 ----is a broad spectrum anthelmintics
- 2 Bacteria which retain the color of crystal violet are known as----
- 3 ----- is an anticancer drug for various types of cancer and is recommended by WHO
- 4 ---- used as indicator in complexometric titration.
- 5 FSSAI stands for-----
- 6 Malachite methane dye belongs to class -----.

T.Y. BA/BS

[ Time : 2 ½ Hours ]

[ Total marks: 75 ]

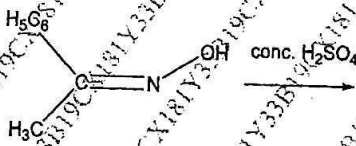
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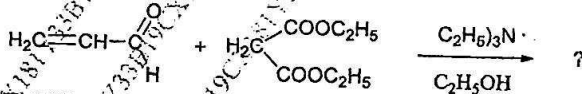
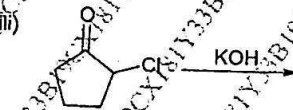
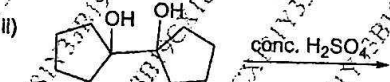
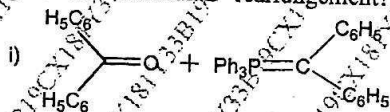
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- N.B. : (1) All questions are compulsory.  
 (2) Figures to the right indicate full marks.  
 (3) Use of logarithmic table/non-programmable calculator is allowed.

1. Attempt Any Three of the following:
- A. Explain with mechanism the addition of bromine to but-2-ene as both stereospecific and stereoselective reaction. 15
  - B. a) Write a note on enantiotropic ligands. 5  
 b) Define stereoselective and stereospecific reactions. 3
  - C. Discuss the stereochemistry of base-induced dehydrohalogenation of 1-bromo-1,2-diphenylpropane. 2
  - D. a) What are acidic and basic  $\alpha$ -amino acids? Give one example of each. 5  
 b) Give the preparation of methionine by Strecker synthesis. 3
  - E. Explain Merrifield's solid phase peptide synthesis for the preparation of tripeptides. 2
2. Attempt Any Three of the following:
- A. Complete the following reaction. Give name of the reaction and discuss the mechanism and stereochemistry involved in it. 15



- B. a) What is molecular rearrangement? Complete the following reactions: 5



- C. a) Explain Killiani-Fischer synthesis with suitable example. 3  
 b) Give the stepwise methylation of  $\alpha$ -D-glucopyranose. 2

D. Convert following open chain Fischer projection formulae into Haworth formulae:

- i)  $\beta$ -D-Fructopyranose
- ii)  $\alpha$ -D-Ribopyranose

E. a) What is the action of the following reagents on D-glucose?

- i)  $\text{NaBH}_4$
- ii)  $\text{Br}_2$  in  $\text{H}_2\text{O}$
- iii)  $\text{HIO}_4$

b) What are glucosides? Give one example.

3. Attempt Any Three of the following:

A. a) Explain symmetrical and asymmetrical stretching vibrations.  
b) Explain with reason whether carbon tetrachloride shows significant absorption peaks in IR spectrum.

B. a) Define Chemical Shift. Mention the unit in which it is expressed. What are the different scales in which it is measured?

b) What structural details can be determined from a Proton Magnetic Resonance (PMR) spectrum?

C. Describe controlled hydrolysis of nucleic acids.

D. An organic compound has the molecular formula  $\text{C}_8\text{H}_{10}\text{O}$ . Determine the index of its hydrogen deficiency and deduce its structural formula from the following spectral data. Also write the name of the compound and justify your answer.

IR ( $\text{cm}^{-1}$ ): 3500, 1600, 1570, 760 & 710

PMR ( $\delta$ -ppm): 1.6 (3H, doublet), 4.2 (1H, singlet,  $\text{D}_2\text{O}$  exchangeable), 4.9 (1H, quartet), 7.4 (5H, multiplet)

a) Give the structure of pyrimidine bases present in DNA.

b) Predict the number of signals and the splitting pattern in PMR spectra of the n-Propyl bromide.

4. Attempt Any Three of the following:

a) Define the following terms:

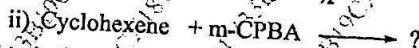
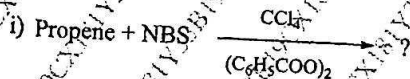
- i) Plastics
- ii) Resins
- iii) Elastomers

b) Enlist the biomedical uses of Polymers.

What is meant by tacticity of polymer? Explain the types of stereoisomers resulting from tacticity.

c. a) Explain Rosenmund reduction with a suitable example.

b) Complete the following reactions:



D. What is the action of  $\text{LiAlH}_4$  on the following compounds?

- i) Acetone
- ii) Methyl cyanide
- iii) Nitroethane
- iv) Cinnamaldehyde
- v) Acetyl chloride

- E. a) Discuss the preparation, properties and uses of Polypropylene.  
 b) Write a brief note on Diene polymerization.

5. Answer the following:

- A. Select whether the following statements are true or false (Any five)
- Glycine is an example of acidic  $\alpha$ -amino acid.
  - Cyclic osmic ester is formed in syn-hydroxylation of alkene.
  - Beckman rearrangement of ketoxime is highly stereospecific in nature.
  - All monosaccharides are non-reducing sugars.
  - Acetone gives two absorption bands in PMR spectrum.
  - Guanine and cytosine are bonded by three hydrogen bonds.
  - Phenol-Formaldehyde resin is a thermoplastic polymer.
  - LAH is used to reduce polar unsaturated groups.

B. Select the correct option and complete the following statements. (Any five)

- Transition state has ..... energy.
  - highest
  - moderate
  - lowest
  - equal
- The amino acids which are synthesized by human body are called .....  $\alpha$ -amino acids.
  - Essential
  - Acidic
  - Non-essential
  - basic
- ..... is an example of ketose.
  - Ribose
  - Fructose
  - Glucose
  - Arabinose
- Epimer of D-glucose is .....
  - D-Mannose
  - D-Fructose
  - D-Ribulose
  - D-Xylulose
- The acidic proton of a carboxylic acid is found at ..... ppm in NMR.
  - 0-2.0
  - 2.0-4.0
  - 8.0-10.0
  - 10.0-12.0
- Nucleic acids on complete hydrolysis give sugar, bases and .....
  - hydrochloric acid
  - nitric acid
  - phosphoric acid
  - acetic acid
- Natural rubber is a polymer of .....
  - Vinyl chloride
  - Styrene
  - Butadiene
  - Nylon 66
- ..... is an addition polymer.
  - Bakelite
  - Nylon 6
  - Polystyrene
  - Terylene

Match the column: (Any five)

- |                        |                        |
|------------------------|------------------------|
| a. $SN^2$ reaction     | i. Allylic bromination |
| b. $-CO-NH-$           | ii. Glycoside          |
| c. Salicin             | iii. IR Spectrum       |
| d. Arabinose           | iv. Single strand      |
| e. Finger Print Region | v. Aldopentose         |
| f. RNA                 | vi. Adipic acid        |
| g. Nylon 66            | vii. Ketopentose       |
| h. NBS                 | viii. One step         |
|                        | ix. Peptide linkage    |
|                        | x. Two step            |

[ Time : 2 ½ Hours]

[Total marks: 75]

- N.B. : (1) All questions are compulsory.  
(2) Figures to the right indicate full marks.  
(3) Use of logarithmic table/non-programmable calculator is allowed.

1. Attempt Any Three of the following:

- Write three advantages and two limitations of dropping mercury electrode.
- With respect to polarography, explain the following terms,  
i) Residual current, ii) Diffusion current
- In the polarographic analysis of Pb(II) ions, the following results were obtained for a solution:  $i_d = 21.64 \mu\text{A}$ ,  $D = 9.8 \times 10^{-6} \text{ cm}^2 \text{ s}^{-1}$ ,  $m = 3.4 \text{ mg s}^{-1}$ ,  $t = 4 \text{ s}$ . Calculate the concentration of Pb(II) in the sample solution
- Explain the interference of dissolved oxygen, with reactions involved in the normal polarographic analysis. How can the interference be removed?
- Explain the nature of amperometric titration curves when,  
i) Titrand is reducible but other species are not  
ii) Titrant is reducible but other species are not

2. Attempt Any Three of the following:

- Draw a schematic diagram of instrumentation in HPLC. Give any three requirements of high-pressure pumps used in HPLC.
- Explain the principle of HPTLC. Write a note on stationary phase used in HPTLC.
- Discuss any five applications of HPLC.
- What are ion exchange resins? How are they classified?
- Define ion exchange capacity. How is it determined for cation exchanger?

3. Attempt Any Three of the following:

- What is food processing? Explain the need for food processing and food preservation.
- Describe Lane-Eynon's method for the analysis of lactose in milk.
- Give the composition of tea? Explain the differences between green tea and mixed tea.
- What are the sensory properties of cosmetics? Differentiate between deodorant and antiperspirant.
- Describe the ash analysis of lipsticks with respect borate and zinc oxide.

4. Attempt Any Three of the following:

- Draw a neat and labelled diagram of thermobalance used in TGA analysis. Explain any three components of it.
- What is meant by DTA? Give any three characteristics of reference material used in DTA.
- Discuss the DTA curve of  $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$  with the help of reactions involved in it.
- Discuss applications of thermometric titration 1) Neutralization titration of HCl vs. NaOH 2) Complexometric titration of Mixture of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  vs. EDTA.
- Give any five applications of neutron activation analysis (NAA).

5. Answer the following:

- A. Select whether the following statements are true or false (Any five):
- Helium gas is passed during electrolysis of an electrolyte in polarography.
  - Diffusion current is directly proportional to the concentration of metal ion.
  - Inert gas is used to degas the solvent to be used as mobile phase in HPLC.
  - The efficiency of strong ion exchanger is affected by pH.
  - Deodorants reduce perspiration.
  - Zinc oxide is added to face powder to increase its capacity.
  - TGA is a thermal method used to determine mass of substance against temperature.
  - NAA is not a radioanalytical method.

- B. Select the correct option and complete the following statements (Any five):
- Rotating platinum electrode is used in amperometric titration as \_\_\_\_\_ electrode.
    - reference
    - working
    - combined
    - inert
  - In DME when the drop gets detached, the current becomes \_\_\_\_\_.
    - maximum
    - zero
    - minimum
    - negative
  - \_\_\_\_\_ is an example of natural ion exchangers.
    - talc
    - clay
    - quartz
    - sand
  - \_\_\_\_\_ detector is used in HPLC.
    - Flame ionisation
    - Electron capture
    - Refractive index
    - Thermal conductivity
  - Pasteurisation of milk is carried out at \_\_\_\_\_.
    - 63° C and 72° C
    - 110° C and 180° C
    - 63° C and 130° C
    - 0° C and 5° C
  - Honey contains large quantity of \_\_\_\_\_ than glucose.
    - Sucrose
    - Fructose
    - Maltose
    - Lactose
  - Thermometric titration involves measuring \_\_\_\_\_ generated during chemical reaction.
    - Paramagnetic nature
    - Pressure
    - Heat
    - Fission
  - In \_\_\_\_\_ technique double pan are used to hold sample and reference material.
    - TGA
    - NAA
    - Thermometric titration
    - DTA

C. Match the column (Any five):

- A
- Triton X-100
  - Nitrogen gas
  - HPTLC
  - Polystyrene
  - Chicory
  - Irradiation
  - NAA
  - Phase Transitions

- B
- Physical method
  - Synthetic ion exchanger
  - DTA curve of sulphur
  - Maxima suppressor
  - Densitometer
  - Neutron flux
  - Remove oxygen
  - Additive in coffee
  - Chemical method
  - PMT

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Time: 2 ½ Hours

Total marks : 75

- N.B. : (1) All questions are compulsory.  
 (2) Figures to the right indicate full marks.  
 (3) Use of logarithmic table/non-programmable calculator is allowed.

1. Attempt Any Three of the following:

- A. What is crystal field splitting? Explain with reference to tetrahedral complexes. 5
- B. Explain Jahn-Teller distortions in octahedral complexes with suitable example. 5
- C. How is  $10Dq$  value determined for an octahedral complex? 5
- D. Define Crystal field stabilisation energy. Calculate CFSE for the  $d^4$  and  $d^5$  configuration in strong field octahedral complexes. 5
- E. Explain the following factors affecting crystal field splitting: 5
  - i) Nature of the ligands.
  - ii) Position of metal in transition series.

2. Attempt Any Three of the following:

- A. Discuss the associative mechanism of ligand substitution reaction in metal complexes. 5
- B. Write a note on selection rules for electronic transitions. 5
- C. Draw a labelled molecular orbital diagram of  $[FeF_6]^{4-}$  complex and comment on its magnetic property. 5
- D. Explain the effect of charge and size of central metal ion on the stability of metal complexes. 5
- E. What is microstates? Calculate number of microstates for following configuration: 5
  - a)  $d^3$
  - b)  $d^2$

3. Attempt Any Three of the following:

- A. Write a note on Ionic organometallic compounds. 5
- B. Discuss the following chemical reaction of organometallic compounds of main group elements. 5
  - i) Reactions with protic solvent
  - ii) Alkylation reactions
- C. Discuss any five chemical properties of ferrocene. 5
- D. i) What is metallocene? Give the structure of any two metallocenes. 3  
 ii) Give any two physical properties of ferrocene. 2
- E. Distinguish between Homogeneous and Heterogeneous catalysis. 5

4. Attempt Any Three of the following:

- A. What is metallurgy? Write a brief note on the hydrometallurgy. 5
- B. Explain in detail electrolytic refining of copper. 5
- C. Give the preparation of Xenon difluoride and discuss its structure. 5
- D. Describe the isolation of Noble gases by Charcoal adsorption method. 5
- E. Discuss the mechanism of Sodium and Potassium ion pump in biological systems with suitable diagram. 5

## 5. Answer the following:

A. Select whether the following statements are true or false. (Any five)

- Weak field ligands produce small degree of splitting.
- CFT predicts abrupt changes in the magnetic properties of complexes.
- $S_N^1CB$  mechanism in ligand substitution in complex involved acid hydrolysis.
- Complex with chelating group are more stable than those with unidentate ligands.
- The compound that possesses non-metal-halogen bond were broadly considered as organometallic compound.
- The good catalysts are those which shows variable oxidation state.
- Roasting involves the conversion of sulphide ores to their oxides by reaction with oxygen.
- Neon lights are used in green house.

B. Select the correct option and complete the following statements. (Any five)

a. \_\_\_\_\_ is lower than  $\Delta_o$  in complexes.

- a)  $\Delta_f$       b)  $\Delta_{sp}$       c)  $\Delta_E$       d)  $\Delta_H$

b. \_\_\_\_\_ is example of weak field ligand.

- a) CO      b)  $CN^-$       c)  $F^-$       d) SCN

c.  $S_N^1$  mechanism of ligand substitution reaction form ..... coordinate intermediate.

- a) 5  
b) 3  
c) 7  
d) 8

d. A metal chelate involves ..... ligands.

- a) unidentate  
b) polydentate  
c) ambidentate  
d) monodentate

e. \_\_\_\_\_ are electron deficient and behaves as Lewis acids

- a)  $Al(CH_3)_3$       b)  $NH_3$       c)  $H_2O$       d)  $CH_4$

f. In  $\beta$  hydride elimination hydrogen that is transferred is formally considered as --

- a)  $H^+$       b)  $H^-$       c)  $H_2$       d)  $H$

g. \_\_\_\_\_ ore among the following is concentrated by froth floatation method.

- a) carbonate      b) sulphide      c) oxide      d) chlorate

h. The Noble gas used for filling incandescent electric bulbs is -----

- a) Helium      b) Neon      c) Argon      d) Xenon

C. Match the column: (Any five )

- Column A
- a.  $[\text{Fe}(\text{CN})_6]^{2-}$
  - b. ESR Spectrum of  $[\text{IrCl}_6]^{2-}$
  - c.  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
  - d. Intra-metal
  - e. Wilkinson's catalyst
  - f. Ferrocene
  - g. Copper pyrites
  - h. Azurin

- Column B
- i.  $\text{CuFeS}_2$
  - ii.  $[\text{RhCl}(\text{PPh}_3)_3]$
  - iii. Blue copper protein
  - iv. Serrated curve
  - v. Low spin complex
  - vi. High spin complex
  - vii. Sandwich compound
  - viii. d-d transition
  - ix. Non blue protein
  - x. Smooth curve

\_\_\_\_\_

Time: 2 ½ Hours

Total marks: 75

- N.B. :** (1) All questions are compulsory.  
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**Physical Constants:**

$$N = 6.022 \times 10^{23}$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

$$R = 8.314 \text{ J/K mol}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$\frac{2.303 RT}{nF} = \frac{0.0592}{n} \text{ at } 298\text{K}$$

1. Attempt **Any Three** of the following:
- Write a note on liquid junction potential. Give functions of salt bridge. 5
  - Derive an expression for the emf of electrode concentration cell reversible to anions. 5
  - Define the following terms 5
    - Activity coefficient
    - Ionic strength
    - decomposition potential
    - Concentration cell
    - Overtoltage
  - Write a note on polarization. 5
  - In electrolysis of 1 N sulfuric acid, the hydrogen overvoltage at lead cathode was found to be 0.48 V at 298 K for a given current density. What will be the hydrogen overvoltage if the current density is increased eight times to its present value for the same cathode under same condition. (Given:  $b = 0.12$ ) 5
2. Attempt **Any Three** of the following:
- Give the classification of polymer based on its source and physical properties. 5
  - Write a note on Light emitting polymers. 5
  - Discuss use of viscometer in determination of molecular weight of polymer. 5
  - A sample of protein consists of 10% molecules of molecular weight 10,000 and 80% of 20,000 and 10% of 40,000. Calculate the number average and weight average molecular weights. 5
  - Explain the three-component system exhibiting the formation of two pair of partially miscible liquids. 5
3. Attempt **Any Three** of the following:
- Explain phenomenon of Black body radiation using Quantum mechanics and also give limitations of Classical mechanics in explaining it. 5
  - A microscope using suitable photon is employed to locate an electron in an atom within a distance of  $0.1 \text{ \AA}$ . What is the uncertainty involved in the measurement of its velocity? (Given,  $m_e = 9.1 \times 10^{-31} \text{ kg}$ ) 5
  - What is standing wave? Explain the boundary conditions. 5
  - Define renewable energy? Write advantages of hydrogen as energy medium. 5
  - Write short note on: 5
    - Concept of operator
    - Band gap theory

4. Attempt Any Three of the following: 5
- A. Comment whether following elements are NMR active or not? 5  
1)  $^1\text{H}$  2)  $^{13}\text{C}$  3)  $^{15}\text{N}$  4)  $^{16}\text{O}$  5)  $^3\text{He}$
  - B. Derive fundamental equation of NMR spectroscopy. 5
  - C. Explain the processes: i) Spin-Spin relaxation ii) Spin lattice relaxation 5
  - D. Draw schematic diagram of ESR spectrophotometer and describe various components of it. 5
  - E. Explain the hyperfine splitting ESR spectra of hydrogen. 5
5. Answer the following: 5
- A. Select whether the following statements are **true** or **false** (Any five) 5
    - a. In case of galvanic cells both half cells are chemically identical with differing concentrations
    - b. The cell represented as,  $\text{Ag} / \text{AgNO}_3 (a_1) | \text{AgNO}_3 (a_2) / \text{Ag}$  is an example of electrolyte concentration cell with transference reversible to cation.
    - c. PVC is a naturally occurring polymer.
    - d. Air is one component system.
    - e. The wave function should have numerous values.
    - f. Efficiency of solar cell is above 70%.
    - g. ESR spectra are observed in radio frequency region.
    - h. Carbon tetrachloride is ideal solvent for NMR spectrophotometer.
  - B. Select and write the appropriate answer. (Any five ) 5
    - a. For the HCl electrolyte the activity can be represented \_\_\_\_\_  
 a)  $a = (m_{\pm}\gamma_{\pm})^2$                       c)  $a = 4(m_{\pm}\gamma_{\pm})^2$   
 b)  $a = (m_{\pm}\gamma_{\pm})^3$                       d)  $a = 4(m_{\pm}\gamma_{\pm})^3$
    - b. The equation for Debye Hückel limiting law is given as \_\_\_\_\_  
 a)  $\log \gamma = -A Z_+ Z_- \sqrt{\mu}$                       c)  $\log \gamma = -A Z_+ Z_- \mu$   
 b)  $\log \gamma = A Z_+ Z_- \sqrt{\mu}$                       d)  $\log \gamma = A Z_+ Z_- \mu$
    - c. A monomer of PVC is \_\_\_\_\_  
 a) Vinyl chloride    b) Succinic acid    c) Vinyl acetate    d) Glycol
    - d. Which of the following phase transition indicate transformation of solid into a gas without intermediate liquid stage?  
 a) Melting    b) Boiling    c) condensation    d) Sublimation
    - e.  $8e^{4x}$  is an eigen function of the operator  $d/dx$ , the eigen value is -----  
 a) 8    b) 4    c) 32    d) 2
    - f. The fundamental equation of de Broglie's theory of wave-particle duality is  
 a)  $\lambda = hm/v$     b)  $\lambda = h/mv$     c)  $\lambda = h/p^2$     d)  $E = hv$
    - g. For a free electron, the value of g-factor (Landes Splitting factor) is \_\_\_\_\_  
 a) 1.1900    b) 2.1000    c) 2.0023    d) 2.0050
    - h. Larmour precesional angular velocity is given by \_\_\_\_\_  
 a)  $\Omega = \gamma H$     b)  $\Omega = \frac{v}{H}$     c)  $\Omega = v (H-1)$     d)  $\Omega = v H$

## C. Match the column: (Any five)

- |                                     |   |
|-------------------------------------|---|
| a. Salt bridge                      | i. $\eta_{rel} - 1$                           |
| b. Concentration cells              | ii. $C - P - 2$                               |
| c. Specific Viscosity               | iii. Need of Photoelectric effect             |
| d. 'F' is                           | iv. Minimization of liquid junction potential |
| e. Threshold frequency of radiation | v. $E^0 = 0$                                  |
| f. AlN                              | vi. $E^0 \neq 0$                              |
| g. Spin angular momentum            | vii. Minute bar magnet                        |
| h. Spinning nucleus                 | viii. Binary semiconductor                    |
|                                     | ix. $\sqrt{I(I+1)} \cdot h/2\pi$              |
|                                     | x. Pure semiconductor                         |

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