

s question paper contains 4 printed pages.]

Your Roll No.....

No. of Question Paper : 8561

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ue Paper Code : 42163512

e of the Paper : Ethnobotany

e of the Course : **B.Sc. Life Sciences : Skill
Enhancement Course**

ster : V

ion : 3 Hours

Maximum Marks : 38

Instructions for Candidates

Write your Roll No. on the top immediately on receipt of
this question paper.

Attempt **all** questions.

Keep all of their parts together.

Define the following terms (**any five**):

(1×5=5)

(i) GPS

P.T.O.

- (ii) TKDL
- (iii) Participatory forest management
- (iv) Herbarium
- (v) Paleoethnobotany
- (vi) Biopiracy

(b) Write suitable answers of the following :

- (i) A plant used to cure cancer
- (ii) A plant which is used in Alzheimer's disease
- (iii) Father of Indian Ethnobotany
- (iv) A plant which is associated with Lord Vishnu
- (v) A plant which is used as insect-repellent

2. Write botanical name, family, part used and ethnobotanical uses of any **four** :

- (i) Neem
- (ii) Tiger-claw

- (iii) Snake-root
- (iv) Ashwagandha
- (v) True Indigo

Write short note on any two : (2.5×2=5)

- (i) Major ethnic groups in India
- (ii) *Gloriosa superba*
- (iii) Knowledge of ancient literature in ethnobotany

How endangered taxa can be conserved through forestry management practices. (2)

Knowledge is wealth, it expands when we share. Explain it in terms of Ethnobotany. (4)

Explain the role of ethnic groups in conservation of the plant genetic resource. (3)

Discuss the various protection methods of traditional knowledge in India. (4)

(b) What do you understand by the term Ethnobotany
how it is different from Economic Botany?

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This question paper contains 4 printed pages.

Your Roll No.

No. of Ques. Paper : 5090 **H**
Unique Paper Code : 216555
Name of Paper : Genetics and Genomics (LSPT-512)
Name of Course : B.Sc. (Prog.) Life Sciences
Semester : V
Duration : 3 hours
Maximum Marks : 75

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt five questions in all, including
Question No. 1 which is compulsory.
All questions carry equal marks.*

(a) Define (any five):

- (i) Barr body
- (ii) Pseudodominance
- (iii) Missense mutation
- (iv) Proteomics
- (v) Dicentric chromosome
- (vi) Conditional lethal mutation.

1×5=5

(b) Give one contribution of (any five):

- (i) Barbara McClintock
- (ii) W. Sutton and T. Boveri

Turn over

- (iii) Calvin Bridges
- (iv) Craig Venter
- (v) Alfred Sturtevant
- (vi) Mary Lyon.

(c) Fill in the blanks:

- (i) Linkage between the genes can be detected by deviation from the Mendel's principle of
- (ii) Allele for color-blindness is located on chromosome
- (iii) The phenomenon of bringing about equal number of products synthesized under the control of the same gene carried on X-chromosomes is called as
- (iv) The X and Y chromosomes in *Melandrium* have a common segment.
- (v) When a gene affects many aspects of phenotype, it is said to be

2. Write short notes on (any *three*):

- (a) Lyon hypothesis
- (b) Inheritance pattern of white eye color in *Drosophila*
- (c) Allopolypoidy
- (d) Shot gun sequencing
- (e) Chi Square Analysis.

3. Differentiate between (any *five*):

- (a) Inversion and Translocation
- (b) Complete and Incomplete linkage
- (c) Codominance and Incomplete dominance

- (d) Penetrance and Expressivity
 (e) Dominance and Epistasis
 (f) Test cross and Reciprocal cross. 3×5=15

(a) A pure dextral female snail is crossed with a pure sinistral male snail. Give the genotype and phenotype of F_1 , F_2 and F_3 progeny with reasons. 10

(b) Write down the common features of model organisms. Discuss *Arabidopsis thaliana* as a model organism in genetic study. 5

(a) In sweetpea the dominant allele R causes purple flower and recessive allele r causes red flower in homozygous condition. The dominant allele L causes long pollen grain, and recessive allele l causes round pollen grain in homozygous condition. In F_2 generation from a cross between double heterozygous purple flowered plant with long pollen grains and a red flowered plant with round pollen grain, the following results were obtained:

Purple flower, long pollen grain	296
Purple flower, round pollen grain	19
Red flower, long pollen grain	27
Red flower, round pollen grain	85

Give the genotypes of parents and progenies. Calculate recombination frequency. 8

(b) Give the cause and symptoms for Klinefelter syndrome. 5

(c) What is the phenotype of a person who has:

- (i) XY with SRY genes deleted
 (ii) XXV with SRY genes deleted? 2

Turn over

6. (a) What are physical mutagens? Discuss the role of ionizing and non-ionizing radiations in inducing mutation.
- (b) Explain the Celera genomics project and the sequencing methodology used in the project.
7. (a) What is Pedigree Analysis? Explain the inheritance of a recessive trait with the help of a suitable example.
- (b) Explain why the recombination frequency never exceeds 50%.
- (c) Give the number of Barr bodies present in an individual with chromosomal constitution XXXYY and XXYY.

[This question paper contains 6 printed pages.]

Your Roll No.....

No. of Question Paper : 5043

H

Question Paper Code : 217161

Name of the Paper : CHPT-101 : CHEMISTRY - I

Name of the Course : B.Sc. (Prog.) Physical Sci. / Life
Sci. / Applied Sci.

Semester : I

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

Write your Roll No. on the top immediately on receipt of this question paper.

Attempt any **Three** questions from **Section-A** and **Section-B** respectively.

SECTION - A

- Write the Schrodinger's wave equation. Explain the terms involved in it.
- Plot the radial distribution curves for 3p, 3d orbitals.
- Why half-filled and fully filled orbital systems are more stable?

P.T.O.

- (d) Write the values of three quantum number's (n, l, m) for electron in 4f and 3d orbitals. (2,2)
- (e) Draw the shape of d orbitals. Indicating the wave function. (2,2)
2. (a) BeCl_2 has zero dipole moment while H_2S has value.
- (b) Write Born lande's equation for calculating energy. Explain all the terms in it.
- (c) Calculate the % ionic character of Si-H bond if Pauling electronegativity of Si and H are 1.4 and 2.1 respectively.
- (d) Discuss the lattice energy.
- (e) Which cation will exert a greater polarizing power in the following cases? Explain.
- (i) Na^+ or Mg^{2+} (ii) Cu^{2+} or Ca^{2+} (2½,2½)
3. (a) Discuss the hybridization of the central atom and geometry of the following molecules/ions.
- XeF_4 , SO_4^{2-} , NH_3 , I_3^-
- (b) Draw the resonance structure of CO_3^{2-} .

- (c) State the fundamental rules of VSEPR theory.
- (d) Explain the diamagnetic behaviour of N_2 molecule with the help of M.O. diagram. (4,2½,3,3)

- (a) Explain the Born Haber Cycle with suitable example. (3½)

- (b) Write short notes on any **three** of the following :

- (i) Hybridization
- (ii) Fajan's Rule
- (iii) Dipole moment
- (iv) Solvation energy

(3,3,3)

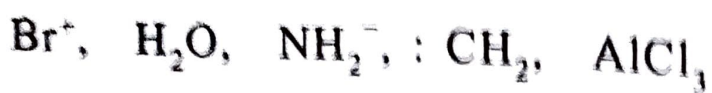
SECTION - B

- (a) Explain the following :

- (i) Benzyl free radical is more stable than methyl free radical.
- (ii) Boat conformation of cyclohexane is less stable than chair conformation of cyclohexane.

(iii) Ethylamine is more basic than aniline.

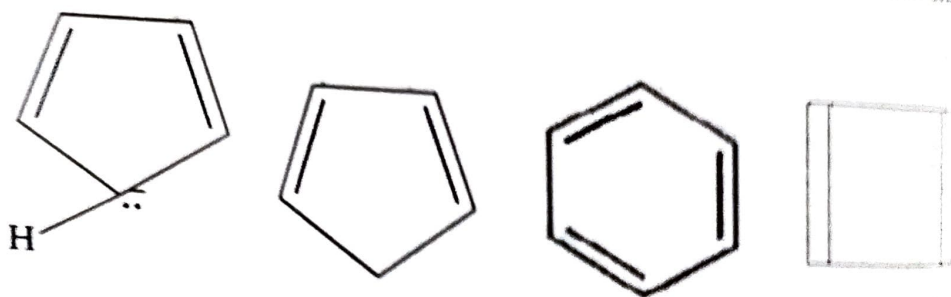
(b) Classify the following as electrophiles and nucleophiles.



(c) How many stereoisomers are possible for 2,3-dibromobutane? Write their structures and give their relationship with each other. (6)

6. (a) Give a chemical test to distinguish between but-1-yne and but-2-yne.

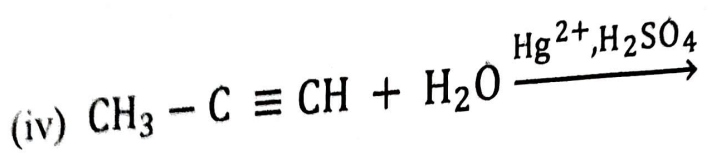
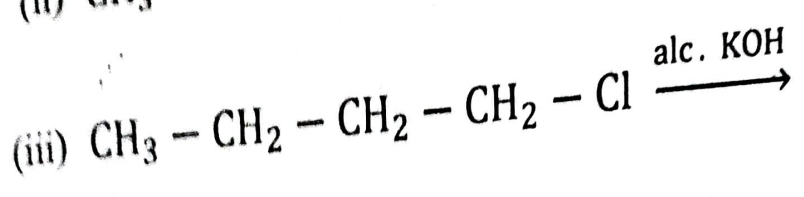
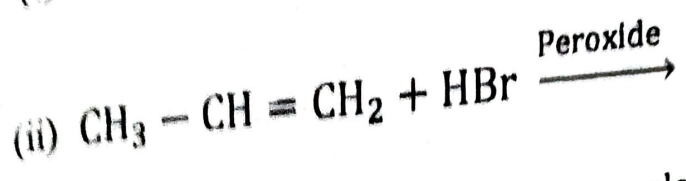
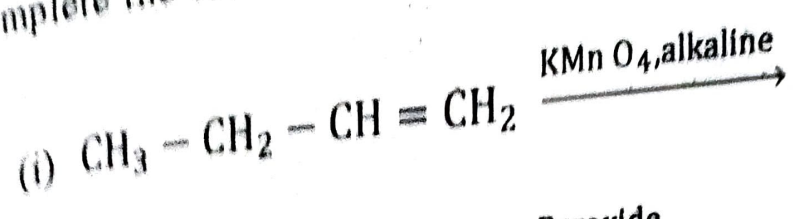
(b) Explain which of the following are aromatic in nature.



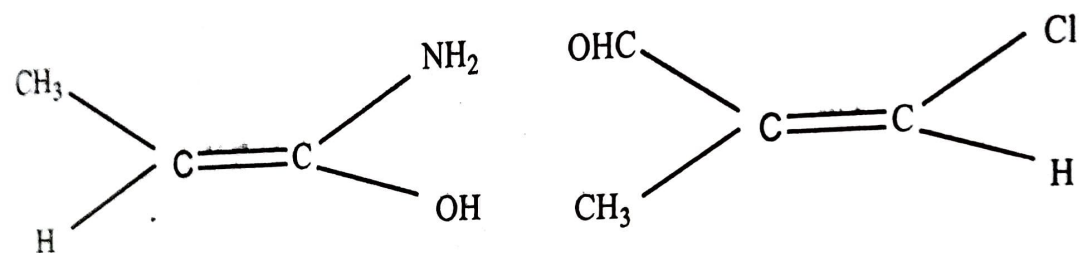
(c) Draw Newmann projection for different conformations of n-butane. Which of the conformation is most stable and why? (1/2)

7. (a) Methane and chlorine react in presence of light to form chloromethane. Give mechanism for this reaction.

(b) Complete the following reactions :

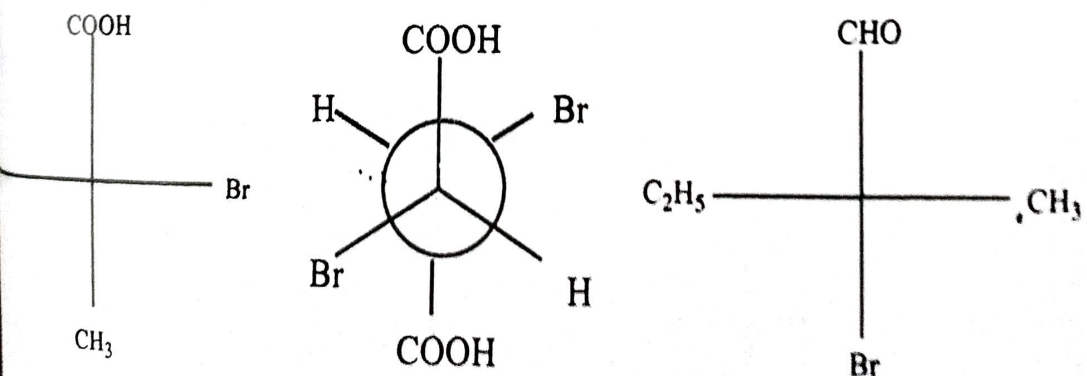


(c) Giving priority, assign E-/ Z- to the following :



(2½, 6, 4)

(a) Assign R-/S- configuration to each of the following :



(b) Write short notes on any **two** of the following:

- (i) Wurtz reaction
- (ii) Ozonolysis of alkenes
- (iii) Geometrical isomerism

(c) Differentiate between meso compound and racemic mixture.

This question paper contains 6 printed pages.

Your Roll No.

Sl. No. of Ques. Paper : 5065 H
Unique Paper Code : 217361
Name of Paper : CHPT-303 (Solutions,
Conductance, Electrochemistry
and Functional Group Organic
Chemistry - II)
Name of Course : B.Sc. Life Sc. / Phy Sc. / Industrial
Chem. / Analytical Chem.
Semester : III
Duration : 3 hours
Maximum Marks : 75

(Write your Roll No. on the top immediately
on receipt of this question paper.)

Answer six questions in all, three questions from each Section.

Use of scientific calculator is allowed.

Use separate answer sheets for Section A and Section B.

SECTION A

Attempt **three** questions in all.

Question No. 1 is compulsory.

All questions carry equal marks.

1. Attempt any five questions:

(a) Explain why a eutectic mixture has a definite composition and sharp melting point yet it is not a compound.

- (b) What are the electrochemical reactions that take place at calomel electrode?
- (c) The ionic molar conductivity of hydrogen ion is much greater than any other ion. Give reason.
- (d) How will you explain the presence of both lower and upper CST for certain systems?
- (e) Give and justify the number of components in the system:



- (f) Usually a saturated solution of KCl or NH_4NO_3 is used in the salt bridge. Explain.
- (g) Explain why enthalpy and volume of mixing for the formation of ideal binary solution is zero.
- (h) State and explain Kohlrausch's law of independent migration of ions.

$$2\frac{1}{2} \times 5 = 12\frac{1}{2}$$

2. (a) What is meant by the process-solvent extraction? Explain why the process of extraction is more efficient if the solvent is used in a number of small portions rather than in one whole lot.
- (b) Why do binary solutions deviate from ideality? The vapour pressure of pure benzene and toluene at 40°C are 184.0 torr and 59.0 torr, respectively. Calculate the partial pressures of benzene and toluene, the total vapour pressure of the

solution and the mole fraction of benzene in the vapour above the solution that has 0.40 mol fraction of benzene. Assume that the solution is ideal.

(c) Differentiate between congruent and incongruent melting points. 4,6,2½

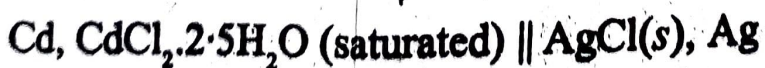
3. (a) Define specific conductance, molar conductance and equivalent conductance. What are their S.I. units?

(b) The molar conductances of sodium acetate, hydrochloric acid and sodium chloride at infinite dilution are 91.0×10^{-4} , 426.16×10^{-4} and $126.45 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$, respectively at 25°C . Calculate the molar conductance at infinite dilution for acetic acid. Is transport number of ions related to molar conductivity at infinite dilution? Give reason for your answer.

(c) Draw and explain the conductometric titration of a weak acid with a strong base. 4½,4,4

4. (a) Differentiate between concentration cell with and without transference.

(b) The emf of the cell



in which the cell reaction



is 0.6753 volt at 25°C and 0.6915 volt at 0°C . Calculate the free energy change (ΔG), enthalpy change (ΔH) and entropy change (ΔS) of the cell reaction at 25°C .

- (c) How is the pH of a solution determined using (i) hydrogen electrode and (ii) quinhydrone electrode? 4, 4½, 4

5. Write short notes on:

(a) Moving Boundary Method

(b) Phase Diagram of Sulphur

(c) Lever Rule or Glass Electrode. 4½, 4, 4

SECTION B

Attempt three questions in all.

All questions carry equal marks.

6. (a) Arrange the following acid derivatives in decreasing order of reactivity towards nucleophilic substitution and give reason:



(b) Explain the following:

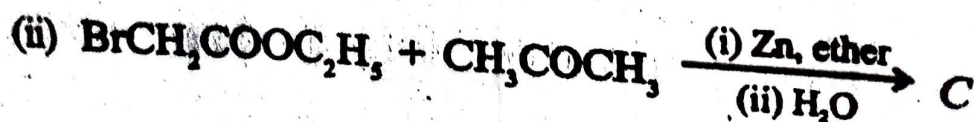
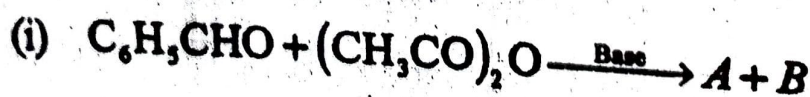
(i) Acetyl chloride is hydrolysed more readily than benzoyl chloride.

(ii) Benzoic acid is stronger acid than acetic acid.

(iii) *p*-hydroxy benzoic acid is weaker acid than *m*-hydroxy benzoic acid.

(c) Discuss Hell-Volhard-Zelinsky reaction with mechanism.

(d) Complete the following reactions:



7. (a) Write short notes on the following (any two):
- Gabriel's Phthalimide Synthesis
 - Hofmann Bromamide Reaction
 - Schotten-Baumann Reaction.
- (b) How will you chemically differentiate between aniline and N-methyl aniline?
- (c) Complete the reactions:
- $\text{ArNH}_2 + \text{CHCl}_3 + 3\text{KOH} \rightarrow \text{A}$
 - $\text{ArNH}_2 + \text{Br}_2 \xrightarrow{\text{CS}_2} \text{B}$
 - $\text{ArN}_2^+\text{Cl}^- + \text{H}_2\text{O}/\text{H}^+ \xrightarrow{\Delta} \text{C}$
- (d) Give a detailed account of Hofmann elimination and compare it with Saytzeff elimination. 5,2,2,3½
8. (a) How will you convert D-arabinose to D-glucose and D-mannose by Killiani-Fischer synthesis?
- (b) How will you convert D-glucose to D-fructose?
- (c) Draw the Haworth projection for α -D-glucopyranose and β -D-fructofuranose.
- (d) Write short notes on the following:
- Mutarotation
 - Ruffs Degradation. 2½, 1, 2, 5
9. (a) Give the name and mechanism of the reaction involved in the synthesis of ethyl acetoacetate from ethyl acetate.
- (b) What is tautomerism? Give the structures of keto and enol form of ethyl acetoacetate.

How can the following compounds be obtained from ethyl acetoacetate:

- (i) 2-Pentanone
- (ii) Butanoic acid
- (iii) Succinic acid?

5,3,4½

Question paper contains 6 printed pages.

Your Roll No.

No. of Ques. Paper : 5071
Paper Code : 217561
H
Name of Paper : CHPT-505 : Chemistry – V
Chemistry of d Block Elements,
Quantum Chemistry and
Spectroscopy
Name of Course : B.Sc. Programme Life Science /
Physical Science / Applied Life
Science (Agrochemical & Pest
Management) / Applied Physical
Science (Analytical Chemistry /
Industrial Chemistry)
Semester : V
Duration : 3 hours
Maximum Marks : 75

(Write your Roll No. on the top immediately
on receipt of this question paper.)

Attempt three questions from Section A and three questions
from Section B. Sections A and B are to be attempted
in separate portions of the same answer sheet.

Please indicate the Section you are attempting at the
appropriate place and do not intermix the Sections. The
questions should be numbered in accordance to the number
in the question paper.

Calculators and log tables may be used.

SECTION A

Attempt any three questions.

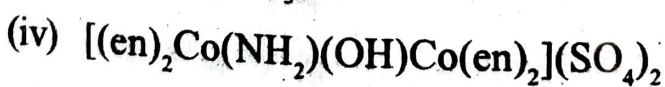
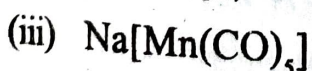
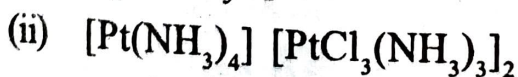
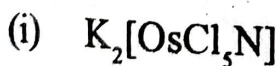
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1. (a) Give brief reasons for any *three* of the following:
- Cu(II) compounds are coloured while Cu(I) compounds are colourless.
 - Zinc, cadmium and mercury are softer than the transition metals.
 - Octahedral complexes of Co(III) may be of inner and outer orbital types but those of Cr(III) are only inner orbital.
 - Many transition metals and their compounds act as catalysts.
 - The atomic radii of zirconium and hafnium are very similar.

(b) Define, using *two* examples, an ambidentate ligand. What specific type of isomerism is displayed in complexes containing such ligands? How does an ambidentate ligand differ from a bidentate ligand? 9,3½

2. (a) Explain why a d^9 octahedral complex with six identical ligands is not expected to have identical bond lengths. Give the appropriate splitting diagram of such a case where the axial bonds are longer than the equatorial bonds.

(b) Give the IUPAC names of any *three* of the following:



(c) The magnetic moments of $[Fe(H_2O)_6]^{3+}$ and $[Fe(CN)_6]^{3-}$ are 5.9 BM and 1.8 BM respectively. Explain on basis of

198] Indicate which of these is an inner orbital complex and which is an outer orbital complex. 5, 4, 3

Write the formulae of any three of the following:

- (i) Barium tetrafluorobromate(III)
- (ii) Diamminesilver(I) tetracetatoaurate(III)
- (iii) Aquatris (triphenylphosphine) palladium(0)
- (iv) Bis (ethylenediamine) copper(II) tetrahydroxoaurate(II)

199] Calculate the CFSE in terms of Δ_o of the Co^{2+} ion placed in a tetrahedral field. Draw the splitting diagram and explain why the splitting pattern differs in tetrahedral and octahedral fields.

200] Indicate the type of isomerism and one test to distinguish between the following:

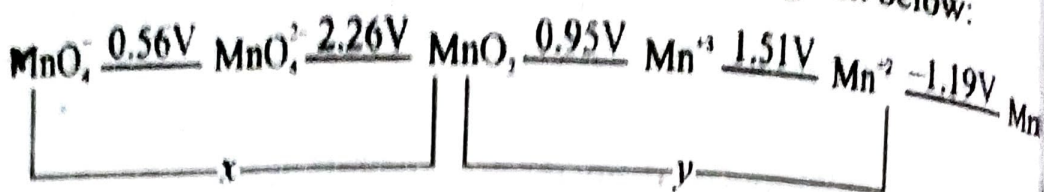
- (i) $[\text{Co}(\text{NH}_3)_5]\text{SO}_4$ and $[\text{CoSO}_4(\text{NH}_3)_5]$
- (ii) $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2$ and $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 4\text{H}_2\text{O}$ 4, 1, 4, 4

201] Explain using CFT why an octahedral complex may be high spin or low spin but a tetrahedral complex is generally high spin.

202] Indicate the appropriate choice and give brief reasons:

- (i) Greater value of Δ_o $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ or $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
- (ii) Good reducing agent Sm(II) or Ce(IV)
- (iii) Optically active cis or $\text{trans} [\text{CrCl}_2(\text{en})_2]^{+}$

(c) The Latimer diagram of manganese is given below:



Calculate x and y and indicate by showing necessary calculations which species will be disproportionate.

Or

(c) Write short notes on any *two* of the following:

- (i) Separation of lanthanides by ion exchange
- (ii) Spectrochemical series
- (iii) Variable oxidation states of $3d$ elements.

3,4½,5

SECTION B

Attempt any *three* questions.

Physical Constants

$$\text{Planck's constant} = 6.626 \times 10^{-34} \text{ J s}$$

$$\text{Velocity of light} = 3 \times 10^8 \text{ m s}^{-1}$$

$$\text{Avogadro's number} = 6.023 \times 10^{23} \text{ mol}^{-1}$$

$$\text{Atomic mass unit} = 1.661 \times 10^{-27} \text{ kg}$$

$$\text{Mass of electron} = 9.109 \times 10^{-31} \text{ kg}$$

$$\pi = 3.142$$

5. (a) Write the mathematical expressions for the position operator x and the linear momentum operator p_x .
- (b) Prove that the momentum and position operators do not commute with each other.
- (c) Examine which of the following are acceptable wave functions:

(i) $\psi = x^2$

(ii) $\psi = e^x$

(iii) $\psi = e^{-x}$

(iv) $\psi = A \sin x$

(2) Prove that the wave functions of a particle in one-dimensional box are normalized. 2,2½,4,4

(3) The fundamental vibration frequency of $\text{N}^{14}\text{O}^{16}$ is observed at 1870 cm^{-1} . Evaluate the zero point energy and the force constant of the molecule.

(b) A molecule AB is undergoing rotational motion under the rigid rotator approximation. What is this approximation? Write the mathematical expression for the Hamiltonian, Schrodinger's equation and the rotational energy E_{rot} associated with this system.

(c) Which of the following molecules can exhibit a pure microwave spectrum: Cl_2 , NH_3 , CO , C_2H_2 ? Explain briefly. 4,4½,4

(a) Explain the terms degeneracy and node using the particle in a box problem as an example.

(b) Predict the wave number of the lowest energy absorption band in the conjugated octatetraene molecule given that the average carbon-carbon bond distance is 0.141 nm .

(c) For a photochemical reaction, $\text{A} \rightarrow \text{B}$, 1.08×10^{-5} moles of B are formed on absorption of 5.89 J at 360 nm . Calculate the quantum efficiency of the reaction. Explain why the quantum yield is quite high for certain reactions. 4,4,4½

Turn over

8. (a) Write a short notes on any *three* of the following:
- (i) Fluorescence and Phosphorescence
 - (ii) Beer-Lambert's Law
 - (iii) Bathochromic and Hypsochromic shift
 - (iv) Bohr's correspondence principle.
- (b) Define eigenfunction and eigenvalue.

3/23/2