

KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY

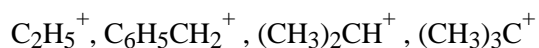
B.Sc., CHEMISTRY
SEMESTER -I
SUB: GENERAL CHEMISTRY-I (CCH 11)

SECTION –A (2 Marks)

1. Define Quantum Numbers.
2. Define Pauli Exclusion Principle .
3. Define Hund's Rule.
4. Define Aufbau Principle.
5. Define (n+l) rule.
6. What are S-Block elements?
7. What are p-Block elements?
8. What are d-Block elements?
9. What are f-Block elements?
10. Define Periodicity of properties.
11. Define Atomic volume.
12. Define Atomic or ionic radii.
13. Define Covalent radii.
14. Define Vanderwall radii.
15. Give electronic configuration of Sodium atom.
16. Give electronic configuration of potassium atom.
17. Give electronic configuration with atomic number 29 and 57.
18. What are the values of four quantum numbers for valency electron of sodium?
19. Draw the shapes of S and p orbital.
20. Draw the shapes of S and p orbital.
21. Define Ionic bond.
22. Define Radius ratio.
23. Define Lattice energy.
24. Define Hydration energy.
25. Define Born-Haber cycle.

26. Define Fajan's rule.
27. Define Covalent Bond.
28. What is Hybridisation?
29. What is SP Hybridisation?
30. What is SP^2 Hybridisation?
31. What is SP^3 Hybridisation?
32. Define VSPER theory.
33. Define MOT.
34. Define Bond Order.
35. Why He_2 has no bond order?
36. What are bonding orbitals?
37. What are anti-bonding orbitals?
38. Draw VSPER structure for Ammonia.
39. Draw VSPER structure for methane.
40. Draw MOT Diagram of hydrogen molecule.
41. Define Inductive effect.
42. Define Steric effect.
43. Define Inductomeric effect.
44. Define Electromeric effect.
45. Define Mesomeric effect.
46. Define Resonance energy.
47. Define Hyperconjugation.
48. Define Steric effect.
49. Define cleavage of bonds.
50. Define Homolytic cleavage.
51. Define hetrolytic cleavage.
52. What are types of cleavage?
53. Define Carbocations.
54. Define carboanion.

55. Write the increasing order of stability of following carbocations:



56. Write any one method for generation of free radicals.

57. Give any two examples of heterocyclic fission.

58. Give any two examples of homocyclic fission.

59. What is meant by equivalent weight of acid.?

60. What is meant by equivalent weight of Base?

61. Define quantum.

62. Define Planck theory.

63. Define Photo electric effect.

64. Define Compton effect.

65. Write De Broglie equation.

66. Define Heisenberg uncertainty principle.

67. Define Davison Germer experiment.

68. Write Schrodinger wave equation.

69. Write Difference between Ψ and Ψ^2

70. Write ideal gas equation.

71. Write Kinetic gas equation.

72. Define rms.

73. Define average velocity.

74. Define most probable velocity.

75. Define Boyle's law

76. Define Charles's law

77. Define Avogadro's law

78. Calculate rms velocity of Oxygen gas at 27°C

79. Write different values of R.

80. Define Boyle's temperature.

81. Define Molarity.

82. Define Molality.

83. Define Normality.

84. Define Mole Fraction.
85. Define Standard.
86. What are the types of standards?
87. Define Primary standard.
88. Define Secondary standard.
89. Define Volumetric principle.
90. Define Titration.
91. Define Acid base Titration.
92. Define Complexometric Titration.
93. Define Redox Titration.
94. Define Iodometric Titration.
95. Define iodimetric Titration.
96. Define indicators.
97. Define metal ion indicators.
98. Write the structure of EDTA.
99. Define Acid base indicators.
100. Define mixed indicators.

SECTION-B (5 Marks)

1. Write a short note on Principal quantum numbers.
2. Write a short note on Azimuthal quantum numbers.
3. Write a short note on Magnetic quantum numbers.
4. Write a short note on Spin quantum numbers.
5. State and explain Pauli Exclusion Principle.
6. State and explain Hund's Rule.
7. State and explain Aufbau Principle.
8. State and explain $n+1$ rule.
9. Write the limitations of Aufbau Principle.
10. Explain the stability of half filled and completely filled orbitals?
11. Write Favorable conditions for the formation of an ionic bond.
12. Write the properties of ionic bond.

13. What are the factors affecting the hydration energy.
14. What are the application of lattice energy?
15. Explain Born- Haber Cycle.
16. Explain Covalent bond.
17. Explain Fajan's rule.
18. Explain MOT Diagram of Neon molecule.
19. Explain MOT Diagram of oxygen molecule.
20. Explain MOT Diagram of Nitrogen molecule.
21. State and explain VB theory.
22. What are the limitation of Lattice energy?
23. How lattice energy is calculated?
24. Describe the comparison VB and MOT.
25. Arrange and explain the following acid in order of their strength
 - (i) acetic acid
 - (ii) Formic acid and
 - (iii) Chloroacetic.
26. Write the rules of Resonance.
27. Write the types of Organic reactions with examples.
28. What is cleavage of bonds? Explain its types.
29. Describe +I and -I effects.
30. Explain why chloroacetic acid is more acidic than acetic acid?
31. Explain Planck theory of radiation.
32. Explain Photo electric effect.
33. Explain Einstein theory.
34. Explain Davison germer Experiment.
35. Explain Schrodinger wave equation.
36. Write the significance of Ψ .
37. Write the significance of Ψ^2 .
38. Explain Ideal gas equation.

39. Explain Volumetric principle.
40. Explain Primary standard.
41. Explain Secondary standard.
42. Explain the conditions of precipitation titration.
43. Explain metal ion indicators.
44. Explain Adsorption Indicators .
45. Write the condition for choice of suitable absorption indicators.
46. Explain Quiniod theory.
47. Explain Ostwald theory.
48. Discuss the principle involve in choosing indicators?
49. Define equivalent weight .Describe any two any methods.
50. Explain equipartition energy.

SECTION-C (10 Marks)

1. Explain Quantum Numbers in Detail.
2. Explain Shapes of s, p,d and f.
3. Define S block elements and Write its characteristics.
4. Define p block elements and Write its characteristics.
5. Define d block elements and Write its characteristics.
6. Define f block elements and Zero elements and Write its characteristics.
7. Define Atomic volume and Write its Factors affecting.
8. Define atomic radii and Write its Factors affecting.
9. Define Ionization potential and Write its Factors affecting.
10. Define Covalent and vander wall radii and Write its Factors affecting.
11. Define Electron affinity and Write its Factors affecting.
12. Define Electronegativity and Write its Factors affecting.
13. Write the applications of Electronegativity.
14. Explain Ionic Bond in detail.
15. Explain hydration Energy in detail
16. Explain Lattice energy in detail.

17. Explain the following using VSEPR:
Water, Beryllium chloride, Ammonia, Sulphur hexafluoride, Phosphorus pentachloride, Methane.
18. Explain MOT of O_2^+ , O_2 , O_2^- .
19. Explain MOT of CO.
20. Write the Properties of Covalent Bond.
21. Explain sp , sp^2 , sp^3 Hybridization.
22. Explain geometry of methane.
23. Explain geometry of ethylene.
24. Explain geometry of acetylene.
25. Explain geometry of benzene.
26. Explain Inductive effect in detail.
27. Explain Resonance effect in detail.
28. Explain Resonance in detail.
29. Explain Hyperconjugation in detail.
30. Explain Steric effects in detail.
31. Explain Carbo cations in detail.
32. Explain Carbo anions in detail.
33. Explain Probability Distribution of electrons in detail.
34. Explain Kinetic theory of gases in detail.
35. Explain Maxwell Distribution in detail.
36. Explain Compton effects in detail.
37. Explain C_p and C_v .
38. Explain Boyle temperature calculations in detail.
39. Explain Coefficient of α and β and its relationship in detail.
40. Explain Quantum theory in detail.
41. Explain photoelectric effect in detail.
42. Explain Acid base Titration in detail.
43. Explain Complexometric Titration in detail.
44. Explain Redox Titration in detail.
45. Explain Indicators in detail.
46. Explain Precipitation Titration in detail.

47. Explain Adsorption Indicators in detail.

48. Explain Metal Ion indicators in detail.

49. Explain Acid base indicators in detail.

Write the Applications of Complexometric Titration

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER –I
SUB: Allied-Physics-I (CAPH 15C)**

UNIT I - Properties of matter

Part – A- Two marks questions

1. Define elasticity.
2. State poisson's ratio.
3. Define plasticity
4. State Hookes' law
5. Define poisson's ratio
6. Write a notes on Youngs' modulus, Rigidity modulus and Bulk modulus.
7. Define stress and strain and its SI units.
8. Define cantilever?
9. Define torsion pendulum.
10. What is couple of twist?
11. Define gravitation.
12. What is meant by acceleration due to gravity?
13. Define center of oscillations.
14. Define viscosity.
15. Define viscous forces.
16. What is meant by surface tension?
17. What is up thrust forces in liquid?

Part – B – Five marks questions

1. Describe and derive the expression for the bending moment of beams.
2. Derive an expression for the work done in stretching of twisting a wire.
3. Describe the centre of oscillation and center of suspension are interchangeable.
4. Write a note on effect of temperature and pressure of viscosity of liquid.
5. Write a brief note on energy stored in a twisted wire.

Part – C – Ten marks questions

1. Explain with necessary theory, how to determine the acceleration due to gravity by simple pendulum method.
2. Determine the value of g by compound pendulum method.
3. What is a cantilever? Obtain an expression for the depression at the free end of a thin light beam clamped horizontally at one end and loaded at the other.

4. Describe the relevant theory, an experiment to determine the Young's Modulus of the material of a bar by non-uniform bending (Pin and microscope method).
5. Derive Poiseuille's formula for the rate of flow of a liquid through a capillary tube. Describe a laboratory method for determining the coefficient of viscosity of a liquid at room temperature.
6. Describe with necessary theory, how you would determine the rigidity modulus of a wire experimentally by using the torsion pendulum.
7. Describe with necessary theory, how the rigidity modulus of a rod experimentally by the static torsion method.
8. Determine the surface tension of liquid by drop weight method.
9. Describe the experimentally to determine the interfacial tension between water and kerosene.

UNIT II - Thermo Electricity

Part – A- Two marks questions

1. Define Seebeck effect.
2. What is meant by Thomson effect?
3. Define Peltier effect.
4. What is meant by thermocouple?
5. What is meant by thermo electric power?

Part – B – Five marks questions

1. Describe a method of measuring the thermo emf.
2. Write the difference between the Peltier effect and Joule effect.
3. What is meant by Peltier effect? Describe the determination of the Peltier co-efficient at a junction.
4. Define Thomson coefficient and Explain the demonstration of Thomson effect.

Part – C – Ten marks questions

1. Describe the thermodynamics of thermocouple and derive the expression for Peltier and Thomson coefficient.
2. What is thermo-electric diagram? Show how Peltier and Thomson emf's in a general couple, neutral temperature and the temperature inversion.

UNIT III – Transient current and magnetism

Part – A- Two marks questions

1. Define inductance.
2. Define resistor and capacitors.
3. What is meant by LCR circuit.
4. Define magnetism.

5. What is called magnetic moment?
6. Define pole strength.
7. Define magnetic induction.
8. Define magnetic permeability and susceptibility.

Part – B – Five marks questions

1. Write the few properties of magnet.
2. Write a note on the Deflection magnetometer to determine the magnetic moment and horizontal component of earth's magnetic field B_H

Part – C Ten marks questions

1. Derive Helmholtz's equations for the growth and decay of electric current in a circuit containing a resistance and an inductance.
2. Derive the expression for the growth and decay of charge in a circuit containing resistance and capacitors.
3. Analyze the growth and decay of charge in LCR circuit.
4. Determine the M and B_H using deflection magnetometer and vibration magnetometer.

UNIT IV – Acoustics

Part – A- Two marks questions

1. How are sound waves classified?
2. Define decibel.
3. What is meant by resonance in hall? How can it be controlled.
4. What is meant by reverberation?
5. Define reverberation time.
6. Define absorption coefficient of a material.
7. What are the characteristic of ultrasonics?

Part – B – Five marks questions

1. Write a note on acoustics of buildings.
2. Determine the frequency of vibration of a stretched string.
3. Explain how will you determine sound absorption coefficient.
4. Write the properties of ultrasonics.
5. Write any five important medical applications of ultrasonic waves.

Part – C Ten marks questions

1. Explain the piezo electric method of production of ultrasonic wave and state its properties.
2. Derive sabine's formula for reverberation time.
3. Explain the acoustic aspects of hall and auditorium.
4. Determine the AC frequency of stretched string by using sonometer.

UNIT V – Laser and fiber optics

Part – A- Two marks questions

1. Write the differences between spontaneous emission and stimulated emission?
2. What is meant by population inversion and how it is achieved?
3. What is pumping action?
4. What are the methods commonly used for pumping action?
5. What is optical pumping?
6. What are characteristics of laser or properties of laser?
7. What is optical resonant cavity?
8. Mention the applications of lasers in industry?
9. What is the principle of laser action?
10. Mention the medical applications of laser?
11. What are the conditions to be satisfied for total internal reflection?
12. Explain the basic principle of Fiber optic communication?
13. What are the main requirements of light sources used in fiber optic communication?
14. What is meant by endoscope?
15. The refractive index of core and cladding are 1.60 and 1.49 respectively. Calculate the critical angle at core-cladding interface?
16. Define Active medium and Active centre.

Part – B – Five marks questions

1. Describe the different types of pumping methods.
2. Explain the principle, construction and working of semiconductor Laser (GaAlAs Laser).
3. Describe the basic structure of optical fiber.
4. Distinguish between the single mode and multimode fiber.

Part – C– Ten marks questions

1. For atomic transitions, derive Einstein relations and hence deduce the expressions for the ratio of spontaneous emission rate to be stimulated emission rate.
2. Explain the principle, construction and working of Helium and Neon Laser.
3. Define total internal reflection. Derive an expression for the numerical aperture of optical fiber.
4. Describe the classifications of optical fiber in detail.
5. Explain the optical fiber communication system with block diagram.

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER -I
SUB: GENERAL CHEMISTRY-III (BCH 31)**

Section-A (2 Mark)

1. Define solubility product
2. Write the spot tests for copper and nickel cations.
3. Write the spot tests for aluminium cations.
4. Write the spot tests for magnesium cations.
5. Write the spot tests for ammonium cations.
6. What is common ion effect? Give an example.
7. What are the type of Types of solvents.
8. Define Protic solvent
9. Define Aprotic solvent
10. Define Amphiprotic solvent
11. Define Amphoteric solvent
12. Define - Aqueous solvent
13. Define Non-aqueous solvent
14. Define solvent
15. Write the name of Nitrogen family element.
16. Write the name of carbon family element.
17. Write the name of oxygen family element.
18. What is mean by catenation? What happens to this property when we move down in the carbon group?
19. What is mean by catenation? What happens to this property when we move down in the nitrogen group?
20. What is mean by catenation? What happens to this property when we move down in the oxygen group?
21. Name any two oxy-acids of nitrogen
22. What are the oxides and halides of phosphorous.
23. What are the oxides and halides of carbon
24. What are the oxides and halides of oxygen
25. What are the oxides and halides of silicon
26. What are the oxides and halides of sulphur
27. What are the oxides and halides of nitrogen
28. Name any two oxy-acids of nitrogen
29. Name any two oxy-acids of sulphur
30. Name any two oxy-acids of oxygen
31. Name any two oxy-acids of carbon
32. Name any two oxy-acids of phosphorous.
33. Name any two halides of carbon
34. Name any two halides of silicon
35. Anamalous behaviour of oxygen.

36. What are the essential conditions for a molecule to be aromatic?
37. What are ortho/para orienting groups? Give examples.
38. Define Huckel's (4n +2) Rule
39. Write the reaction of Nitration of benzene
40. Write the reaction of chlorination of benzene
41. Write the reaction of Halogenations of benzene
42. Write the reaction of Sulphonation of benzene
43. Write the reaction of Friedel-Crafts Acylation of benzene
44. Write the reaction of Friedel-Crafts Alkylation of benzene
45. Define Nucleophile
46. Write the SN1 mechanism with a suitable example
47. Write the SN2 mechanism with a suitable example
48. Write the SNi mechanism with a suitable example
49. Write any two differences between SN1 and SN2 reaction.
50. Write E1 elimination reaction
51. Write E2 elimination reaction
52. State Hofmann rule.
53. State saytzeff's rule.
54. What is mean by elimination reaction? How are they classified?
55. Define the term entropy.
56. Mention the essential condition for spontaneity in a chemical reaction.
57. Definition - Heat Engines
58. Criteria of Spontaneity
59. Carnot's theorem (Statement only)
60. Concept of Entropy
61. Definition and Mathematical Statement
62. Randomness and Entropy
63. Unit of entropy
- 64.

Section-B (5 Mark)

1. What is mean by solubility product? Write any two application of solubility product in qualitative analysis.
2. What are the type of Types of solvents.
3. What is common ion effect? Give application. - Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent.
4. Explain spot test reagent.
5. How are the following reagents prepared?
6. i)Aluminon.
7. ii)Alizarin.
8. How are the following reagents prepared?
9. Nessler's reagent.
10. Cupferon
11. How are the following reagents prepared?
12. i) DMG ii) Thiourea
13. Explain lig ammonia as a solvent.
14. What are advantages and disadvantages of liquid ammonia as solvent?
15. Compare the property of carbon and silicon .
16. Explain comparative study of nitrogen family.

17. Comparative study of oxygen family.
18. Comparative study of carbon family.
19. Discuss about oxides and hydride of Nitrogen
20. Anomalous behaviour of oxygen
21. Discuss the mechanism of Nitration of benzene.
22. Discuss the mechanism of Friedel-Crafts Acylation of benzene
23. Discuss the mechanism of Friedel-Crafts Alkylation of benzene
24. Discuss the mechanism of Halogenations of benzene
25. Discuss the mechanism of Sulphonation of benzene
26. Discuss the mechanism of bromination of benzene
27. Discuss the mechanism of chlorination of benzene
28. Explain the S_N2 mechanism with a suitable example.
29. Explain the S_Ni mechanism with a suitable example.
30. Explain the S_N1 mechanism with a suitable example.
31. Explain effect of Structure of Substrate, Solvent, Nucleophile and Leaving Group.
32. Discuss about aromatic nucleophilic substitution reaction.
33. Discuss about aromatic uni molecular nucleophilic substitution reaction
34. Discuss about aromatic bi molecular nucleophilic substitution reaction
35. State and explain Saytzeff's rule.
36. State and explain Hofmann rule
37. Explain modern theory of aromaticity ?
38. What are ortho/para orienting groups? Give examples.
39. Explain Huckel's $(4n + 2)$ Rule.
40. Explain side chain halogenation.
41. Deduce the expression for entropy changes in cyclic reversible process.
42. State the various statements of second law of thermodynamics.
43. Discuss about halides and oxy-acids of Nitrogen.
44. Discuss about aromatic nucleophilic substitution reaction.
45. Explain the mechanism of $E1$ elimination reaction.
46. Explain the mechanism of $E2$ elimination reaction.
47. Discuss about oxides and hydride of Nitrogen
48. Comparison of $E1$ and $E2$ mechanism.
49. Second Law of Thermodynamics
50. Need for the II Law of Thermodynamics
51. Explain Carnot's cycle and its Efficiency
52. Explain Carnot's theorem
- 53.** Derivation of Entropy from Carnot Cycle.
54. Entropy change of an Ideal Gas during Isothermal Process
55. Entropy changes in Cyclic, Reversible and Irreversible Processes
56. Entropy Changes in Physical Transformations
57. Calculation of Entropy Changes with Changes in T, V and P
58. Entropy of Mixing of Ideal Gases
59. Physical Significance of Entropy

Section-C (10 Mark)

1. How are the following reagents prepared?
 - i)Aluminon.
 - ii)Alizarin.
 - iii)Nessler's reagent.
2. Differentiate the following.
 - i)Protic and aprotic solvents.
 - ii) Aqueous and non aqueous solvents.
3. Write short note on anomalous behaviour of O?
4. Explain liquid ammonia as a solvent. What are advantages and disadvantages of liquid ammonia as solvent?
5. Write the preparation of sulphuric acid by Ostwald method.
6. Give brief account on the comparative study of nitrogen family.
7. Give brief account on the comparative study of oxygen family.
8. Give brief account on the comparative study of carbon family.
9. Discuss the mechanism of Friedel-Crafts acylation by citing an example.
10. Discuss the factors affecting the rate of SN1 reaction.
11. Discuss the factors affecting the rate of SN2 reaction.
12. Discuss the factors affecting the rate of SNi reaction.
13. Explain the SN2 & SN1 mechanism with a suitable example.
14. Explain the SNi mechanism with a suitable example.
15. Discuss the mechanism of Nitration of benzene.
16. Discuss the mechanism of Friedel-Crafts Acylation and alkylation of benzene
17. Discuss the mechanism of Friedel-Crafts Alkylation and acylation of benzene
18. Discuss the mechanism of Sulphonation and nitration of benzene
19. Discuss the mechanism of bromination and chlorination of benzene
20. Discuss the mechanism of chlorination of benzene
21. What are elimination reactions? How are they classified? Discuss the mechanism of E1 and E2 reaction.
22. Mention the essential condition for spontaneity in a chemical reaction. Elaborate Carnot's cycle.
23. Explain Hoffmann and Saytzeff rule with suitable example.
24. Discuss about orientation of benzene.

KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY

B.Sc., CHEMISTRY
SEMESTER –I
SUB: Allied-Mathematics-I (CAMA 15C)

UNIT I

1. Diminish the roots of the equation $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$ by 1 and hence solve it.
2. Increase the roots of the equation $x^4 + 12x^3 - 7x^2 + 22x + 24 = 0$
3. Remove the second term from the $x^3 - 6x^2 + 11x - 6 = 0$
4. Solve the equation $x^3 - 3x^2 - 6x + 8 = 0$ if the roots are in A.P.
5. If α, β and γ are roots of the equation $x^3 - 5x^2 - 2x + 24 = 0$ find the value of
i) $\sum \alpha_2\beta$ ii) $\sum \alpha^2$ iii) $\sum \alpha^3$ iv) $\sum \alpha^2\beta^2$
6. Solve the equation $3x^3 - 26x^2 + 52x - 24 = 0$ if the roots are in G.P.
7. Remove the fractional coefficients from the equation $x^3 - \frac{1}{2}x^2 + \frac{3}{2}x - 1 = 0$
8. Find the equation whose roots are reciprocals of the roots of $x^4 - 5x^3 + 7x^2 + 3x - 7 = 0$
9. Find the equation whose roots are the roots of $x^4 - 5x^3 + 7x^2 - 17x + 11 = 0$ each diminished by 4.
10. Find the equation whose roots are those of $3x^3 - 2x^2 + x - 9 = 0$ each diminished by 5.
11. Remove the second term from equation $x^4 - 8x^3 + x^2 - x + 3 = 0$
12. Remove the third term of equation $x^4 - 4x^3 - 18x^2 - 3x + 2 = 0$, hence obtain the transformed equation in case $h = 3$.
13. Transform the equation $x^4 + 8x^3 + x - 5 = 0$ into one in which the second term is vanishing.
14. Solve the equation $x^4 + 16x^3 + 83x^2 + 152x + 84 = 0$ by removing the second term.
15. Solve the biquadratic $x^4 + 12x - 5 = 0$ by Descartes' method.
16. Solve $x^4 - 8x^2 - 24x + 7 = 0$ by Descartes' method.
17. Obtain the relation between the roots and coefficients of general polynomial equation $a^0x^n + a^1x^{n-1} + a^2x^{n-2} + \dots + a^{n-1}x + a^n = 0$.
18. Solve the equation $x^3 - 5x^2 - 16x + 80 = 0$ if the sum of two of its roots being equal to zero.
19. Solve the equation $x^3 - 3x^2 + 4 = 0$ if the two of its roots are equal.

20. Solve the equation $x^3 - 5x^2 - 2x + 24 = 0$ if the product of two of the roots is 12.
21. Solve the equation $x^3 - 7x^2 + 36 = 0$ if one root is double of another.
22. Find the condition that the roots of the equation $x^3 - px^2 + qx - r = 0$ are in A.P.
23. Find the condition that the cubic equation $x^3 + px^2 + qx + r = 0$ should have two roots α and β connected by the relation $\alpha\beta + 1 = 0$
24. If α , β and γ are roots of the cubic equation $x^3 + px^2 + qx + r = 0$ find the value of i) $\Sigma \alpha^2\beta$
ii) $\Sigma \alpha^2$ iii) $\Sigma \alpha^3$ iv) $\Sigma \alpha^2\beta^2$
25. If α , β and γ are roots of the cubic equation $x^3 + px^2 + qx + r = 0$ find the value of $(\beta + \gamma)(\gamma + \alpha)(\alpha + \beta)$.
26. If α , β , γ and δ are roots of biquadratic equation $x^4 + px^3 + qx^2 + rx + s = 0$, find the value of the following symmetric functions
i) $\Sigma \alpha^2\beta$ ii) $\Sigma \alpha^2$ iii) $\Sigma \alpha^3$
27. If α , β , γ and δ are roots of biquadratic equation $x^4 + px^3 + qx^2 + rx + s = 0$, find the value of the following symmetric functions i) $\Sigma \alpha^2\beta\gamma$ ii) $\Sigma \alpha^2\beta^2$ iii) $\Sigma \alpha^4$
28. the equation whose roots are the reciprocals of the roots of $x^4 - 3x^3 + 7x^2 + 5x - 2 = 0$.
29. If sum and product of roots of a quadratic equation are 1 and -1 respectively the required quadratic equation is?
30. Roots of equation $x^3 - 3x^2 + 4 = 0$ are 2, 2, -1, so the roots of equation $x^3 - 6x^2 + 32 = 0$ are?
31. Roots of equation $x^2 + 2x + 1 = 0$ are -1, -1 so the roots of equation $x^3 + 6x + 9 = 0$ are?
32. Roots of equation $x^2 - 2x + 4 = 0$ are 2, 2 so the roots of equation $4x^2 - 2x + 1 = 0$ are?
33. Find the 6th power of the roots $x^3 - x^4 + 1 = 0$.
34. Prove that $x^4 - x^3 + 1 = 0$ has one negative root and 2 imaginary roots.
35. Solve $x^4 + 2x^3 - 5x^2 + 6x + 2 = 0$ if $1+i$ is a root.
36. Diminish the equation $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$ by 1.

37. Find the value of $\sum \alpha^2$ if $x^3 - 6x^4 + 11x - 6 = 0$.
38. Prove that $x^7 - 4x^4 + 2x^3 - 1 = 0$ has atleast 4 imaginary roots.
39. Solve $x^4 + 2x^3 - 21x^2 - 22x + 40 = 0$ whose roots are in A.P.
40. Remove second term of the equation $x^4 + 16x^3 + 83x^2 + 152x + 84 = 0$.
41. If α, β, γ are the roots of the equation then find the equation whose roots are $\sum \alpha + \beta$.
42. Solve $x^4 + 2x^3 - 5x^2 - 6x + 2 = 0$ if $1 + \sqrt{-1}$ is one of the root.
43. $x^3 + 2x + 3 = 0$ has one negative root and two imaginary root?.
44. Solve $3x^6 + x^5 - 27x^4 + 27x^2 - x - 3 = 0$.
45. Find the sixth power of $x^4 - x^3 - 7x^2 + x + 6 = 0$.
46. The equation $x^4 + 4x^3 - 2x^2 - 12x + 9 = 0$ has two pairs of equal roots, find them.
47. Change the signs of the roots of the equation $x^7 + 5x^5 - x^3 + x^2 + 7x + 3 = 0$
48. Transform the equation $x^7 - 7x^6 - 3x^4 + 4x^2 - 3x - 2 = 0$ into another whose roots shall be equal in magnitude but opposite in sign to those of this equation.
49. Change of the equation $3x^4 - 4x^3 + 4x^2 - 2x + 1 = 0$ into another the
50. coefficient of whose highest term will be unity.
51. State and prove Descarts rule.
52. Show that $x^{10} + 10x^3 + x - 4 = 0$ has 8 imaginary roots.
53. Show that $x^6 + 3x^2 - 5x + 1 = 0$ has atleast 4 imaginary roots.
54. Show that $x^4 + 2x^2 + 3x - 9 = 0$ has 1 positive root and 1 negative roots.
55. State Newtons formula.
56. Find the real root of the equation $x^3 + 6x - 2 = 0$.
57. Calculate the places of decimal the positive root of the equation $x^3 + 24x - 50 = 0$.
58. Evaluate $\sqrt{12}$ to Newtons metur decimal places by Newtons method.
59. Find by Newtons method negative root of the equation $x^3 - 21x + 35 = 0$ correct to three decimal places.
60. Find the roots of the equation $x^3 - 5x + 3 = 0$ the roots lies between 1 & 2.
61. Calculate the places of decimal the positive root of the equation $x^3 + 24x - 50 = 0$. Using Horners Method.

UNIT II

1. Define Symmetricic and Skew Symmetric matrices.
2. Verify that the matrix is symmetric or not $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$.
3. Show that every square matrix can be uniquely expressed as the sum of the symmetric and skew symmetric matrices.

4. Express $\begin{pmatrix} 6 & 8 & 5 \\ 4 & 2 & 3 \\ 9 & 7 & 1 \end{pmatrix}$ as the sum of the symmetric and skew symmetric matrices.
5. Define Hermitian and Skew Hermitian matrices.
6. Check whether $A = \begin{pmatrix} 3 & 4 - 5i \\ 4 - 5i & 6 \end{pmatrix}$
7. Show that $\begin{pmatrix} 3 & 1 + 2i \\ 1 - 2i & 2 \end{pmatrix}$
8. Define Orthogonal matrix.
9. Show that $\frac{1}{3} \begin{pmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{pmatrix}$ is Orthogonal.
10. Define Unitary matrix.
11. Prove that $A = \begin{pmatrix} \frac{1+i}{2} & \frac{-1+i}{2} \\ \frac{1+i}{2} & \frac{1-i}{2} \end{pmatrix}$ is Unitary.
12. State Cayley Hamilton Theorem.
13. Verify Cayley Hamilton Theorem for $\begin{pmatrix} 1 & 2 \\ 1 & 1 \end{pmatrix}$.
14. Verify Cayley Hamilton Theorem for $\begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$.
15. Find The Inverse of $\begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -1 \end{pmatrix}$ using Cayley Hamilton Theorem.
16. Define Eigen values and Eigen Vectors.
17. Find the w eigen values and eigen vector: $\begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$.
18. Find the w eigen values and eigen vector: $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & 4 \\ 2 & -4 & 3 \end{pmatrix}$.
19. If $\lambda_1, \lambda_2, \lambda_3$ are the eigen roots of A, find λ_3 of $A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & 4 \\ 2 & -4 & 3 \end{pmatrix}$.
20. Define similar matrices.
21. Diagonalize the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$.
22. Show that $\frac{1}{\sqrt{7}} \begin{pmatrix} 1+i & 2+i \\ 2-i & -1+i \end{pmatrix}$ is unitary.
23. Show that $\begin{pmatrix} \sin \theta & \cos \theta \\ -\sin \theta & \cos \theta \end{pmatrix}$ is orthogonal.
24. Verify Cayley-hamilton theorem for the matrix $\begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$

25. Determine the Eigen values and eigen vectors of $A = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 2 & -1 & 0 \end{pmatrix}$.
26. Determine the Eigen values and eigen vectors of $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.
27. Diagonalize The matrix $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$.

UNIT III

1. $(x+a)^n = ?$
2. Expand
3. $(1+x)^n$
4. $(1-x)^n$
5. $(1+x)^{-n}$
6. $(1-x)^{-n}$
7. Find the Coefficient of x^n in the expansion of $(1/1-x^2)$
8. Expand
9. $(1+x)^{-1}$
10. $(1-x)^{-1}$
11. $(1+x)^{-2}$
12. Find the Coefficient of x^n in the expansion of $(2+3x)^{-3}$
13. Find the Coefficient of x^2 in the expansion of $(1+x)^{-3}$
14. Sum to infinity the series $\frac{4}{2.4} + \frac{4.5}{2.4.6} + \frac{4.5.6}{2.4.6.8} + \dots + \infty$.
15. Sum to infinity the series $\frac{2.4}{3.6} + \frac{2.4.6}{3.6.9} + \dots + \infty$.
16. Show that $3 + \frac{3.5}{8} + \dots + \infty = 4(\sqrt{8-1})$
17. Prove that $\frac{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots}{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + \dots} = \frac{e^2+1}{e^2-1}$
18. Sum to infinity the series $1 + \frac{1+2}{2!} + \frac{1+2+2^2}{3!} + \dots + \infty$.
19. Expand $e^x + e^{-x} / 2$
20. Sum to infinity the series $1 + \frac{2^3}{2!} + \frac{3^3}{3!} \dots + \infty$.
21. Sum to infinity the series $\sum_{n=0}^{\infty} \frac{5n+1}{(2n+1)!}$
22. Sum to infinity the series $1 + \frac{1}{1!} + \frac{1}{2!} + \dots + \infty$.
23. Sum to infinity the series $\frac{1}{0!} + \frac{2^3x}{2!} + \frac{3^3x}{3!} \dots + \infty$.
24. Expand $\log(1-x)$

25. Expand $\log \frac{(1+x)}{(1-x)}$
26. Sum to infinity the series $\frac{11.14}{10.15.20} + \frac{11.14.17}{10.15.20.25} + \dots$
27. Show that $\log x = \frac{x-1}{x+1} + \frac{1}{2} \left(\frac{x^2-1}{(x+1)^2} \right)$
28. When n is large Show that $\left(\frac{n+1}{n-1} \right)^{n/2} = \exp\left(1 + \frac{1}{3n^2}\right)$

UNIT IV

2 MARK QUESTIONS

- Write down the formula for the expansion of $\sin n\theta$ and $\cos n\theta$
- Write the expansion of $\tan n\theta$
- Solve the equation $\cos \theta = \cos \alpha$
- Show that for any positive integer n $\sin \theta = n \cos^{n-1} \theta \sin \theta - \frac{n(n-1)(n-2)}{3!} \cos^{n-3} \theta \sin^3 \theta + \dots$
- Write the expansion of $\frac{\sin 4\theta}{\sin \theta}$
- Prove that $\cos 6\theta = 1 - 18 \sin^2 \theta + 48 \sin^4 \theta - 32 \sin^6 \theta$
- Write the expansion of $\cos 4\theta$
- Write down the formula for $\tan(A+B+C\dots)$
- Express $\sin 3\theta$ in terms of $\sin \theta$
- Solve the equation $\sin \theta = \sin \alpha$
- Show that $\tan \theta = \theta + \frac{\theta^3}{3} + \frac{2\theta^5}{15}$ upto five terms
- Show that the error involved in replacing $\frac{1}{6} (8 \sin \theta - \sin 2\theta)$ by θ is approximately $\frac{1}{30} \theta^5$ if θ is small
- Evaluate $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{\sin^3 x}$
- Prove that $16 \sin^5 \theta = \sin 5\theta + 5 \sin 3\theta + 10 \sin \theta$
- If $\frac{\sin \theta}{\theta} = \frac{5045}{5046}$ prove that $\theta = 1^\circ 58'$ approximately
- Find $\lim_{x \rightarrow 0} \frac{\sin 2x - 2 \sin x}{x^3}$
- Prove that $2^3 \cos^4 \theta = \cos 4\theta + 4 \cos 2\theta + 3$
- The expansion of $\sin \theta$ and $\cos \theta$

- 19 If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$ show that $x+y+z=xyz$
- 20 Show that $2\tan^{-1} x = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$
21. Show that $\tanh 2x = \frac{2\tanh x}{1+\tanh^2 x}$
22. Prove that $\cosh^{-1} x = \log(x + \sqrt{x^2 - 1})$
23. Show that $\cosh 2x = \cosh^2 x + \sinh^2 x$
24. If $x+iy=\sin(A+iB)$ prove that (i) $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$ (ii) $\frac{x^2}{\sinh^2 A} - \frac{y^2}{\cosh^2 B} = 1$
25. Prove that $\cosh(x+y)=\cosh x \cosh y + \sinh x \sinh y$
26. Show that $\tanh^{-1} x = \frac{1}{2} \log_e \frac{1+x}{1-x}$
27. Prove that $\sinh^{-1} x = \log(x + \sqrt{x^2 + 1})$
28. Show that $\cosh^2 x + \sinh^2 x = 1$
29. Prove that $\cosh 2x = \frac{1+\tanh^2 x}{1-\tanh^2 x}$
30. What is the addition formula for $\tanh(x+y)$

5 Marks

1. Prove that $\cos 6\theta = 32\sin^6\theta - 48\sin^4\theta + 18\cos^2\theta - 1$
2. Find the equation whose roots are $\tan\frac{\pi}{16}, \tan\frac{5\pi}{16}, \tan\frac{9\pi}{16}, \tan\frac{13\pi}{16}$
3. Prove that $\frac{\sin 6\theta}{\sin\theta} = 32\cos^5\theta - 32\cos^3\theta + 6\cos\theta$
4. Expand $\frac{\sin 7\theta}{\sin\theta}$ in the powers of $\sin\theta$
5. If $\frac{\tan\theta}{\theta} = \frac{2524}{2523}$ find θ approximately
6. If α, β, γ be the roots of the equation $x^3+px^2+qx+p=0$ prove that $\tan^{-1}\alpha + \tan^{-1}\beta + \tan^{-1}\gamma = n\pi$ radians expect when $q=1$
7. Derive the formula for $\tan(A+B+C\dots)$
8. Prove that when $x = 2\cos\theta, \frac{1+\cos 7\theta}{1+\cos\theta} = (x^3 - x^2 - 2x + 1)^2$
9. Write down the expansion of $\cos 9\theta$
10. Prove that equation $a\sec\theta - b\csc\theta = a^2 - b^2$ has four roots and that the sum of the four values of θ which satisfy it is equal to an odd multiple of π radians

11. Determine a,b,c such that $\lim_{\theta \rightarrow 0} \frac{\theta(a+b\cos\theta)-c\sin\theta}{\theta^5} = 1$
12. Expand $\cos^2\theta \cdot \sin^4\theta$ in a series of cosines of multiple of θ
13. Expand $\sin^6\theta$ in series of cosines of multiples of θ
14. If $\cos^2\theta = A\cos\theta + B\cos3\theta + C\cos5\theta$ show that the value of A, B, C
15. Find $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\sin x + \cos x}{\cos^2 x}$
16. If $\sin(\frac{\pi}{6} + \theta) = 0.51$ find θ approximately
17. Prove that $\sin\theta = \theta - \frac{\theta^3}{3!} + \frac{\theta^5}{5!} \dots$
18. Prove that $\cos\theta = 1 - \frac{\theta^2}{2!} + \frac{\theta^4}{4!} \dots$
19. Determine a and b such that $\lim_{\theta \rightarrow 0} \frac{a - \theta\sin\theta - b\cos\theta}{\theta^4} = \frac{1}{12}$
20. Show that $2\tan^{-1} x = \sin^{-1}(\frac{2x}{1+x^2})$

10 Marks

1. Find the equation whose roots are $2\cos\frac{2\pi}{7}, 2\cos\frac{4\pi}{7}, 2\cos\frac{6\pi}{7}$
2. Show that $\cos\frac{2\pi}{9} \cdot \cos\frac{4\pi}{9} \cdot \cos\frac{6\pi}{9} \cdot \cos\frac{8\pi}{9} = \frac{1}{16}$
3. Prove that $\cos 8\theta = 1 - 32\sin^2\theta + 160\sin^4\theta - 256\sin^6\theta + 128\sin^8\theta$
4. Show that the equation $\sin(\theta + \alpha) = a\sin 2\theta + b$ has four roots and that if they are $\theta_1, \theta_2, \theta_3, \theta_4$ then $\theta_1 + \theta_2 + \theta_3 + \theta_4 = (2k + 1)\pi$
5. Prove that $\frac{\sin 9\theta}{\sin\theta} = 256\cos^8\theta - 448\cos^6\theta + 240\cos^4\theta - 49\cos^2\theta + 1$
6. Prove that $\sin\frac{\pi}{5} \cdot \sin\frac{2\pi}{5} \cdot \sin\frac{3\pi}{5} \cdot \sin\frac{4\pi}{5} = \frac{5}{16}$
7. Prove that the equation $\cos 2\theta + a\cos\theta + b\sin\theta + c = 0$ has in general four solutions $\alpha, \beta, \gamma, \delta$ lying between 0 and 2π and $\alpha + \beta + \gamma + \delta$ is a multiple of π
8. Expand $\sin 7\theta$ as a polynomial in $\sin\theta$. Hence obtain the cubic equation whose roots are $\sin^2\frac{2\pi}{7}, \sin^2\frac{4\pi}{7}, \sin^2\frac{6\pi}{7}$
9. Expand $\tan 4\theta$ in terms of $\tan\theta$ and show that $\tan\frac{\pi}{16}, \tan\frac{5\pi}{16}, \tan\frac{9\pi}{16}, \tan\frac{13\pi}{16}$ are roots of the equation
10. Derived expansion of $\cos n\theta$ and $\sin n\theta$
11. Expand $\cos^5\theta \cdot \sin^3\theta$ in a series of sines of multiple of θ

12. Solve approximately in radians $\sin\left(\frac{\pi}{3} + x\right) = 0.87$
13. Show that $\cos^2\theta \cdot \sin^6\theta = -\frac{1}{2^7}(\cos 8\theta - 4\cos 6\theta + 4\cos 4\theta + 4\cos 2\theta - 5)$
14. Prove that $2^7 \sin^8\theta = \cos 8\theta - 8\cos 6\theta + 28\cos 4\theta - 56\cos 2\theta + 35$
15. Find $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{\sin^3 x}$
16. Prove that $\sin^{-1} \frac{4}{5} + \sin^{-1} \frac{5}{13} + \sin^{-1} \frac{16}{65} = \frac{\pi}{2}$
17. Prove that $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \frac{x+y}{1-xy}$
18. Prove that $\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$
19. Solve the equation $\tan^{-1} 2x + \tan^{-1} 3x = \frac{3\pi}{4}$
20. Prove that $\cos^{-1} \frac{63}{65} + 2\tan^{-1} \frac{1}{5} = \sin^{-1} \frac{3}{5}$
21. If $\tan(A+iB) = x+iy$ prove that (i) $x^2 + y^2 + 2x \cot 2A = 1$
 a. (ii) $x^2 + y^2 - 2y \coth 2B = -1$
22. Prove that $\tanh^{-1} x = \frac{1}{2} \log\left(\frac{1+x}{1-x}\right)$
23. If $\log \sin(\theta + i\varphi) = A + iB$ prove that (i) $\cos(\theta - B) = e^{2\varphi} \cos(\theta + B)$
 1. (ii) $\cosh 2\varphi - \cos 2\theta = 2e^{2A}$
24. Prove that $\frac{\cosh x - 1}{\sinh x} = \frac{\sinh x}{\cosh x + 1} = \tanh \frac{x}{2}$
25. If $\cos(x+iy) = r(\cos\alpha + i\sin\alpha)$ show that $y = \frac{1}{2} \log\left[\frac{\sin(x-\alpha)}{\sin(x+\alpha)}\right]$
26. Separate into real and imaginary part of $\tan^{-1}(x + iy)$
27. Expand $\cosh^8\theta$ in terms of hyperbolic cosines of θ
28. If $\cos^{-1}(\alpha + i\beta) = \theta + i\varphi$ show that (a) $\alpha^2 \operatorname{sech}^2\varphi + \beta^2 \operatorname{cosech}^2\varphi = 1$
 1. (b) $\alpha^2 \sec^2\theta - \beta^2 \operatorname{cosec}^2\theta = 1$
29. 9. If $u = \log \tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$ show that (i) $\theta = -i \log \tan\left(\frac{\pi}{4} + i\frac{\pi}{2}\right)$
 i. (ii) $\tanh \frac{u}{2} = \tan \frac{\theta}{2}$
30. Separate into real and imaginary part of $\tanh(1 + i)$

Unit -V

Section - A

1. If $x^3 + y^3 = 3ax$, find $\frac{dy}{dx}$.

2. Define Saddle point.
3. Find y_n if $y = \log(2x + 3)$
4. If $y = e^{ax}$ then find y_n .
5. If $y = \frac{ax+b}{cx+d}$ find $\frac{d^2y}{dx^2}$.
6. If $y = e^x \sin 2x$ find $\frac{d^2y}{dx^2}$.
7. If $x = at^2$, $y = 2at$, find $\frac{d^2y}{dx^2}$.
8. Find the n^{th} derivative of $\frac{1}{ax+b}$.
9. Find the n^{th} derivative of $\log(ax+b)$.
10. Find the n^{th} derivative of $\sin(ax+b)$
11. Find the n^{th} derivative of $\cos(ax+b)$.
12. Find the n^{th} derivative of $\sin^3 2x$.
13. Find the n^{th} derivative of $\cos^4 x$.
14. Find the n^{th} derivative of $\sin 2x \sin 4x \sin 6x$.
15. Find the n^{th} derivative of $x^2 e^{5x}$.
16. Find the n^{th} derivative of $x^2 \sin 5x$.
17. Find the n^{th} derivative of $e^x \log x$.
18. Find the n^{th} derivative of $\log(4x^2-1)$.
19. If $u = e^x \sin y$ where $x = st^2$ & $y = s^2 t$ find $\frac{\partial u}{\partial s}$ & $\frac{\partial u}{\partial t}$.
20. If $u = x^3 y^4 z^2$ where $x = t^2$, $y = t^3$, $z = t^4$ find du/dt .
21. If $x = r \cos \theta$, $y = r \sin \theta$, find $\frac{\partial(x,y)}{\partial(u,v)}$.
22. If $u = x+y$, $y = uv$ then find $\frac{\partial(x,y)}{\partial(u,v)}$.
23. If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t \sin t$ and $z = e^t \cos t$ find du/dt .
24. If $x = u(1+v)$ and $y = v(1+u)$ find $\frac{\partial(x,y)}{\partial(u,v)}$.
25. If $u = 1/x$, $v = x^2/y$ and $w = x + y + zy^2$ find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.
26. Find the angle between the radius vector and the tangent at any point on the conic section $\frac{1}{r} = 1 + e \cos \theta$.
27. Find the angle between the radius vector and the tangent at any point on the curve $r = a(1 + \cos \theta)$ at $\theta = \pi/2$.
28. Find the angle between the radius vector and the tangent at any point on the curve $r^2 = a^2 \cos 2\theta$ at $\theta = \pi/6$.
29. Find the pedal equation of the curve $r^2 = a^2 \cos 2\theta$.
30. Find the pedal equation of the curve $r = ae^{\theta \cot \alpha}$.
31. Find the pedal equation of the curve $r^n = a^n \sin n\theta$.
32. Write the formula for radius of curvature in polar co-ordinates.
33. Write the formula for finding the curvature of the curve $x = f(\theta)$ and $y = \phi(\theta)$.
34. Show that the radius of curvature of the curve $y = e^x$ at $(0,1)$ is $2\sqrt{2}$.
35. Find the co-ordinates of centre of curvature of the curve $xy = 2$ at the point $(2, 1)$.
36. Define radius of curvature.
37. Find the radius of curvature at the point (r, θ) for the curve $r = a/\theta$.

38. Find the radius of curvature at the point (r, θ) for the curve $r = a \cos \theta$.
39. Find the radius of curvature at the point (r, θ) for the curve $r = a(1 - \cos \theta)$.
40. Show that the radius of curvature at the point (x, y) on the curve $y = \cosh \frac{x}{c}$ is y^2/c .
41. Show that the radius of curvature at the point $(a, 0)$ on the curve $x^3 + y^3 = 2a^3$ is $a/\sqrt{2}$.
42. Find the radius of curvature at the point $(3, 10)$ on the curve $xy = 30$.
43. Find the points on the curve $y^2 = 8x$ at which the radius of curvature is $7\frac{13}{16}$.
44. Find the p-r equation for the curve $r \sin \theta + a = 0$.
45. Find the p-r equation for the curve $r = a/\theta$.
46. Find the p-r equation for the curve $r = a \cos \theta$.
47. Find the p-r equation for the curve $r = a \sec^2 \frac{\theta}{2}$.
48. Find the p-r equation for the curve $r = a \sin^3 \frac{\theta}{3}$.
49. Find the length of the chord of curvature through the of the equiangular spiral $r = ae^{\theta \cot \alpha}$.

Section – B

50. If $y = (x + \sqrt{1 + x^2})^m$ show that $(1 + x^2)y_2 + xy_1 - m^2y = 0$.
51. If $y = a \sin^m x$ prove that $\sin^2 x \frac{d^2 y}{dx^2} = (m^2 \cos^2 x - m)y$.
52. Find the n^{th} derivative of $e^{ax} \sin(bx + c)$ & $e^{ax} \cos(bx + c)$.
53. Find the n^{th} derivative of $e^{3x} \sin x \sin 2x \sin 3x$.
54. Find the n^{th} derivative of $\sin^5 x \cos^4 x$.
55. Find the n^{th} derivative of $\cos x \cos 2x \cos 3x$.
56. If $y = a \cos(\log x) + b \sin(\log x)$ prove that $x^2 y_{n+2} + (2n + 1)xy_{n+1} + (n^2 + 1)y_n = 0$.
57. If $y = e^{a \sin^{-1} x}$ prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (n^2 + a^2)y_n = 0$.
58. If $y = \sin(m \sin^{-1} x)$ prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (m^2 - n^2)y_n = 0$.
59. If $r^2 = x^2 + y^2$ then show that $\frac{\partial^2 r}{\partial x^2} + \frac{\partial^2 r}{\partial y^2} = \frac{1}{r} \left[\left(\frac{\partial r}{\partial x} \right)^2 + \left(\frac{\partial r}{\partial y} \right)^2 \right]$.
60. If $u = \sqrt{x^2 + y^2 + z^2}$ show that $\sum x^2 \frac{\partial^2 u}{\partial x^2} + 2 \sum yz \frac{\partial^2 u}{\partial x \partial y} = 0$.
61. If $u = x^2 \tan^{-1} \left(\frac{y}{x} \right) - y^2 \tan^{-1} \left(\frac{x}{y} \right)$ prove that $\frac{\partial^2 u}{\partial x \partial y} = \frac{x^2 - y^2}{x^2 + y^2} = \frac{\partial^2 u}{\partial y \partial x}$.
62. If $u = \sin \left(\frac{x^2 + y^2}{x + y} \right)$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{x^2 + y^2}{x + y} \cos \left(\frac{x^2 + y^2}{x + y} \right)$.
63. If $z = f(x, y)$ where $x = r \cos \theta$ & $y = r \sin \theta$ show that $\left(\frac{\partial z}{\partial x} \right)^2 + \left(\frac{\partial z}{\partial y} \right)^2 = \left(\frac{\partial z}{\partial r} \right)^2 + \frac{1}{r^2} \left(\frac{\partial z}{\partial \theta} \right)^2$.
64. Transform $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2}$ into polar co-ordinates.
65. If $x = \sin \theta \sqrt{1 - a^2 \sin^2 \varphi}$, $y = \cos \theta \cos \varphi$ then show that $\frac{\partial(x, y)}{\partial(\theta, \varphi)} = \frac{-\sin \varphi [(1 - a^2) \cos^2 \theta + a^2 \cos^2 \varphi]}{\sqrt{1 - a^2 \sin^2 \varphi}}$.
66. If $x + y + z = u$, $y + z = uv$, $z = uvw$ prove that $\frac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$.
67. If $x = \rho \sin \phi \cos \theta$, $y = \rho \sin \phi \sin \theta$, $z = \rho \cos \phi$ find $\frac{\partial(x, y, z)}{\partial(\rho, \theta, \phi)}$.
68. If $u^3 + v^3 = x + y$, $u^2 + v^2 = x^3 + y^3$ show that $\frac{\partial(u, v)}{\partial(x, y)} = \frac{1}{2} \frac{y^2 - x^2}{uv(u - v)}$.

Section – C

69. If $y^{1/m} + y^{-1/m} = 2x$ prove that $(x^2 - 1)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$.
70. If $y = [\log(x + \sqrt{1 + x^2})]^2$ show that $(1 + x^2)y_{n+2} + (2n + 1)xy_{n+1} + n^2y_n = 0$.
Hence find $y_n(0)$.
71. If $e^{m\sin^{-1}x}$ prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (m^2 + n^2)y_n = 0$. Hence find $y_n(0)$.
72. Find the radius of curvature of the curve $r^2 = a^2 \sin 2\theta$.
73. Show that the radius of curvature of the curve $r^n = a^n \cos n\theta$ is $\frac{a^n r^{-n+1}}{n+1}$.
74. Prove that the p-r equation of the cardioids $r = a(1 - \cos\theta)$ is $p^2 = \frac{r^3}{2a}$.
75. Prove that the radius of curvature of the curve $y^2 = \frac{a^2(a-x)}{x}$ at $(a, 0)$ is $\frac{1}{2}a$.
76. Find the radius of curvature at any point of the cycloid $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$.
77. Show that the evaluate of the cycloid $x = a(\theta - \sin\theta)$, $y = a(1 - \cos\theta)$ is another cycloid.
78. Find the angle of intersection of the curves $r = \frac{a}{1+\cos\theta}$ and $r = \frac{b}{1-\cos\theta}$.
79. Prove that the parabolas $r = \frac{a}{1+\cos\theta}$ and $r = \frac{b}{1-\cos\theta}$ intersect at each other orthogonally.
80. Find the pedal equation of the curve $\frac{1}{r} = 1 + e\cos\theta$.
81. Find the pedal equation of the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$.
82. Show that the curves $r = \frac{a}{1+\cos\theta}$ and $r = b(1 - \cos\theta)$ cut each other orthogonally.
83. Find the angle between the curves $r = 2a\cos\theta$, $r = 2a\sin\theta$.
84. Find the angle between the curves $r^2 = a^2\cos 2\theta + b^2$, $r = b$.
85. Find the p-r equation of the curve $y^2 = 4a(x + a)$.
86. Find the p-r equation of the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.
87. Find the p-r equation of the curve $r^m a^m \cos m\theta$.
88. Find the p-r equation of the curve $r = a(1 - \cos\theta)$.
89. Find the radius of curvature at the point $(\frac{a}{4}, \frac{a}{4})$ to the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$.
90. Find the radius of curvature at $x = y = \frac{3a}{2}$ to the curve $x^3 + y^3 = 3axy$.
91. Find the radius of curvature of the curve $xy^2 = a^3 - x^3$ at the point $(a, 0)$.
92. Show that the radius of curvature at t on the curve is $x = 6t^2 - 3t^4$, $y = 8t^3$ is $6t(1 + t^2)^2$.
93. Find the radius of curvature at any point on the curve $r^2 = a^2\cos 2\theta$.
94. Show that the radius of curvature at any point on the equi angular spiral $r = ae^{\theta \cot \alpha}$ is $r \csc \alpha$.
95. Show that the radius of curvature for the centriod $r = a(1 + \cos\theta)$ at the point (r, θ) is $\frac{2}{3}\sqrt{2ar}$.

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER -I
SUB: SBS-Water Treatment and Analysis (CSCH 32)**

PART-A (2 marks)

Unit-I

1. Mention the important characteristic of water.
2. What is meant by Coagulation?
3. How water is classified on the basis of salts present in it?
4. What is meant by hardness? Give its unit.
5. What are the units of hardness?
6. Mention any two sterilizing agents.
7. What is an alkalinity?
8. What are the indicators used to measure hardness?
9. How is alkalinity removed?
10. What is total solid content?
11. What is oxidability? How is it expressed?
12. Define sterilization.
13. What is meant by temporary hardness?
14. How will you detect the hardness?
15. What is meant by permanent hardness?

Unit-II

1. Give the names of any four water softening methods.
2. What is meant by hardness of water?
3. What is Clark's process? What is its drawback?
4. Expand EDTA.
5. Name the indicator used in complexometric titration using EDTA.
6. What is zeolite? What is its use?
7. What are the disadvantages of zeolite process?
8. What is meant by softening of hard water?
9. Write the principle of ion-exchange method.
10. What are the advantages of ion-exchange process?
11. What is the main difference between soft water and DM water?
12. Mention some disadvantages of ion-exchange process.
13. Why hardness is expressed in terms of CaCO_3 equivalent.
14. What is meant by lime-soda process?
15. Mention any two of the functions of lime.

Unit-III

1. Mention the necessary qualities of industrial water.
2. What is meant by reverse osmosis?
3. Write any disadvantages of hard water.
4. What is meant by Desalination?
5. Write any two advantages of hard water.
6. Define sludge. How will you administer it?
7. What are the reason for the boiler corrosions?
8. What is an electro dialysis?
9. What are the conditioning for boiler feed water?
10. What is mean by plumbo solvency? How is it prevented?
11. What are effluents?
12. What are the drawbacks of iron in water for various industries?
13. What are scales and sludges?
14. What are the disadvantages of Scales?
15. How is dissolved oxygen removed from the boiler?

Unit-IV

1. Write about Sampling of water.
2. How is electrical conductivity utilized in water analysis?
3. What is meant by turbidity? How does affects the potability of water?
4. Define pH. What is its importance?
5. How will you identify pH of well water?
6. Define TDS.
7. What is meant by total solids?
8. What is the unit of Turbidity and colour?
9. What is Odour?
10. What are the chemical substance affect portability of water?
11. How are colour removed from water?
12. Write the pH,taste and odour of drinking water.
13. What are the significance of iron in water?
14. What is mineral acidity? Mention its causes?
15. What are the problems on detergent residue in water?

Unit-V

1. Define BOD.
2. Define COD.
3. What is meant by bacteriological examination water?
4. What do you know about E-coli test?
5. Give the adverse effect of nitrate in drinking water.
6. What is dissolved oxygen?

7. How will you find out the presence of radioactivity in water?
8. What are the chemicals required for COD?
9. What is the unit of Dissolved Oxygen (DO)?
10. What are the determination of NH_3 ?
11. How are cyanides removed from the water?
12. What are the sources of chloride in water?
13. Define DO?
14. What are the significance of COD?
15. What is MPN and its importance?

PART-B (5 Marks)

Unit-1

1. Write an account of alkalinity of water.
2. What is the need for disinfection of water? Describe one method of disinfection of water.
3. Give an account on ozonisation.
4. Write notes on hardness of water.
5. What are the characteristics of water?
6. Explain the types and uses of coagulation.
7. What is potable water? What are the essential conditions required it?
8. What is unit for hardness of water?
9. Write any two types of purification of water for drinking purpose?
10. What is mean by hardness of water? How is it classified?

Unit-II

1. Describe Clark's process.
2. Write the notes on: Cold lime soda process.
3. Explain demineralization of water.
4. How will you determine the hardness of water?
5. Explain the different ways of expressive hardness of water.
6. Write the notes on: Lime soda process.
7. What are the advantages and disadvantages of Zeolite process.
8. Discuss about ion exchange process.
9. Write the notes on: Hot lime soda process.
10. Discuss about Modified lime-soda process.

Unit-III

1. What are the requirements of boiler feed water? How is the water obtained in Industries?
2. Write an account of electro dialysis.
3. How will you remove Fe, Mn, and Silicic acid from water sample?
4. Explain the treatment of effluent obtained from paper industries.
5. Give an account on industrial water treatment.

6. How will you convert brackish water into drinking water? Explain.
7. How will you remove Fe and Mn from brackish water?
8. What is colloidal conditioning methods?
9. What is phosphate conditioning methods?
10. Describe the effluent treatment of water from petrochemical industries.

Unit-IV

1. What are the common chemicals affecting the portability of water? Mention their sources.
2. Describe the analysis of suspended solids
3. Describe the analysis of dissolved solids.
4. Write notes on 'solids' present in water.
5. Explain water sampling method for analysis of water.
6. Describe the analysis of iron.
7. How can you measure alkalinity?
8. How can you measure acidity?
9. What are suspended and dissolved solids in water?
10. Describe the analysis of magnesium.

Unit-V

1. Write the notes on the analysis of nitrite, nitrate and fluoride.
2. Describe the E-coli test and its uses.
3. How will you determine sulphate content present in water?
4. Define radio activity of water, How is it removed?
5. How will you determine nitrate content present in water?
6. Explain COD.
7. What is BOD? How is it determined?
8. How will you carry out the bacteriological examination of water?
9. Write about toxic chemical present in water and its analysis.
10. Write the notes on physical examination of water.

PART-C (10 Marks)

Unit-1

1. Describe the following process: a) Clarification, b) Contact coagulation, c) Electrochemical coagulation
2. How will you purify water drinking purposes Explain?
3. Account the following: a) Precipitation, b) Chlorination.
4. Discuss the disadvantages of hard water.
5. Write the notes on characteristics of water?

Unit-II

1. How do you determine the hardness of water? Explain any two chemical methods used to determine the hardness of water.
2. Explain the complexometric titration.

3. Explain ion exchange process for softening of water.
4. Explain the lime soda processes of water softening.
5. Write the notes on: Zeolite process.

Unit-III

1. Explain the treatment of effluent obtained from paper and fertilizer industries.
2. Explain the methods used to convert brackish water into drinking water.
3. Describe the treatment of waste water.
4. What is reverse osmosis? How can remove Fe and Mn from water?
5. Explain the treatment of effluent obtained from petrochemical and power station.

Unit-IV

1. Describe the analysis of calcium, iron and zinc.
2. How will you estimate the free CO₂ present in the water sample?
3. How will you estimate the free chlorine present in the water sample?
4. Explain the colour, turbidity, odour, taste and pH of potable water.
5. Describe the analysis of suspended solids and dissolved solids.

Unit-V

1. Discuss the physical and biological examination of water.
2. Explain the procedure for the determination of COD of water sample.
3. Describe about the bacteriological examination of water.
4. Explain the analysis of ammonia and nitrate present in the water sample.
5. What is dissolved oxygen? How can you measure it?

*****ALL THE BEST*****

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

B.Sc., CHEMISTRY

SEMESTER -I

SUB: Introduction to Information Technology (CNCA 35)

Section-A (2 Mark)

1. Define data.
2. What is information?
3. Explain about Information Technology?
4. Define desktop computer?
5. Explain the term VDU?
6. Define data acquisition?
7. Define MICR?
8. Define text data?
9. Explain Image data?
10. Define audio data?
11. Define video data?
12. Define memory cell?
13. Define capacitor storage cell?
14. Explain flip flop storage cell?
15. Define magnetic storage cell?
16. Define Polycarbonate cell?
17. Define RAM?
18. Define ROM?
19. Explain about CDROM?
20. Define floppy disk with diagram?
21. Explain about flash memory?
22. Define disk interface?
23. Define CPU?
24. Define main memory?
25. Define embedded processor?
26. Define MAR.
27. Define MDR.
28. Define LAN.
29. Explain about client server computing.
30. Define Ethernet connection?
31. Define token ring?
32. Explain star connection?
33. Define WAN?
34. Define Internet?
35. Explain about IP Address?

36. Define about Soft copy?
37. Define about Hard copy?
38. Define CRT?
39. Explain about Display method?
40. Define LCD?
41. Define Active matrix LCD?
42. Define Passive matrix LCD?
43. Define Printer?
44. Explain WYSIWYG?
45. Define programming language?
46. Define operating system?
47. Explain about BIOS?
48. Define Scripting language?
49. Define high level language?
50. Define database?
51. Define AI?
52. Explain about E-Mail with example?
53. Define ISP.
54. Define WWW.
55. Define URL with example.
56. Define telnet.
57. Define Internet telephony.
58. Define URL.
59. Explain the functions of browser.
60. Define hypertext.

Section-B (5 Mark)

1. Explain about types of data?
2. Write note on simple model of computer?
3. How data are processed in computer?
4. Explain about Desktop computer?
5. Explain about the characters represented in computer?
6. Write note on error detecting codes?
7. Explain about memory cell?
8. List out the physical devices used as memory cells?
9. Explain about Floppy disk drive?
10. Explain about archival memory?
11. Write about specification of CPU?
12. How does the CPU interconnects with memory and I/O Units?
13. Explain about LAN Connections?
14. What are all the technologies used in the LAN?
15. Explain about futures of internet technologies?
16. Explain about Video display devices?

17. Explain about Flat panel display?
18. Explain about Laser Printer?
19. Explain the types of operating system?
20. Detail note on functions of operating system?
21. Explain about Classification of programming language?
22. Explain about how to organize the database?
23. Explain about structure of database?
24. Explain about the queries which are used in Database with example?
25. How does the programming language classified based on applications?
26. What are the IT enabled services and careers.
27. Explain about users in IT.
28. How does the information retrieval from the WWW.
29. What are the facilities provided by browser.
30. Explain about resource directories.

Section-C (10 Mark)

1. Detail note on input units?
2. Write an detail note on internal representation on number system?
3. Detail note on RAM?
4. Explain about Ready Only Memory?
5. Explain about Secondary memory and its types?
6. Explain about CPU and Its structure?
7. Write note on LAN and its applications?
8. Detail note on WAN with neat diagram?
9. Detail note on Printers and its types?
10. Explain about Output devices with suitable examples?
11. Detail note on Operating system?
12. Write in detail about programming languages?
13. Write note on DBMS with examples?
14. What are career opportunity in Information Technology.
15. Detail note on E-Mail with examples.
16. Explain about information browsing service.
17. Explain about audio on the internet.
18. Explain about WWW in detail.

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER –I
SUB: INORGANIC CHEMISTRY-I (BCH 51)**

SECTION –A (2 Marks)

1. What is chelation?
2. Write the type of ligand?
3. What is effect of chelation?
4. What is EDTA?
5. Write the structure of EDTA?
6. What is VBT?
7. What is CFT?
8. Define EAN?
9. What is TGA?
10. What is DTA?
11. Write the structure of Al-oxine.
12. Write the structure Ni-DMG.
13. Define CFSE.
14. Define Ionisation isomerism
15. Define hydrate isomerism
16. Define polymerisation isomerism.
17. Define coordination isomerism.
18. Explain the principle involved in TGA.
19. What is peptisation?
20. Define the term, co-ordination number.
21. Name the following complexes.

22. Calculate the EAN number of
23. Write the similarities of VBT and CFT.
24. How will you detect K ion in a solution?
25. Compare the atomic radii of halogens.
26. Name the different oxyacids of halogens.
27. Write any two differences between post precipitation and co-precipitation.
28. What is meant by co-ordination isomerism? Give an example.
29. What are polynuclear complexes? Give an example
30. Write the EAN concept with an example.
31. What are low spin and high spin complexes?
32. Write the structure of $\text{Cr}(\text{CO})_6$ and $\text{Ni}(\text{CO})_4$.
33. Write the structure of Ni-DMG complex.
34. What are pseudo halogens? Give any two examples.
35. Iodine exists as positive state. Give evidences.
36. What is meant by CO-precipitation?
37. Write any two applications of DTA.
38. What is meant by co-ordination number?
39. Define isomerism.
40. Write EAN rule.
41. Explain the term CFSE.
42. What are carbonyls? Give any two examples.
43. What are the uses of DMG and Oxine?
44. What are halogens? Give examples.
45. Write any two oxy acids of halogens.
46. Give the characteristic of a thermobalance.
47. Define masking.

48. Define magnetic susceptibility.
49. Calculate the EAN of CO(III) in $[\text{CO}(\text{NH}_3)]^{3+}$.
50. What is crystal field splitting energy?
51. Give the bridged and non – bridged structures of $\text{CO}_2(\text{CO})_8$.
52. How would you detect potassium ion?
53. Why is the bond angle FOF in F_2O smaller than bond angle clocl in Cl_2O ?
54. What are pseudohalogens? Explain.
55. What are the parameters measured in DTA and TGA.
56. Give any one difference between post precipitation and co – precipitation?
57. What is meant by double salt? Give examples.
58. Character of precipitating agent?
59. Define bridging ligands.
60. Give any two limitations of VBT.
61. What is the EAN for $\text{Mn}_2(\text{Co})_{10}$?
62. Give two examples for mononuclear carbonyls.
63. How would you prepare hypochlorous acid?
64. What is thermogravimetry?
65. What are the various components of DTA apparatus?
66. Define coordination compounds.
67. Explain the term optical isomers.
68. What is spectrochemical series?
69. State the Jahn Teller theorem.
70. Give the structure of Ni-DMG.
71. Give the structure of Cl_2O_7 .
72. Define specific precipitant.
73. What is the principle involved in thermometric titration?

74. Define chelating ligands.
75. The cis – trans isomerism is not possible in tetrahedral complexes ? why?
76. What is crystal field splitting?
77. Define High spin complexes.
78. In many compounds phosphorous and Arsenic act as a acceptor ligands. why?
79. Write any one evidence for the existence of I ion.
80. What are interhalogens? Give two examples.
81. What is peptisation?
82. Define the terms coordination sphere and coordination number.
83. Explain hydrate isomerism with an example.
84. Find the effective atomic number of chromium in $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$.
85. How will you detect potassium ion?
86. Why phosphorous compounds are acting as acceptor ligands?
87. Differentiate natural gas and biogas.
88. What are pigments? Give examples.
89. What are the characteristics of precipitating agent?
90. Explain-Gravimetric factor.
91. Define coordination number.
92. What is polynuclear complex.
93. What is Inner metallic carbonyls?
94. Calculate EAN for $[\text{Pt}(\text{NH}_3)_6]^{4+}$.
95. What is spectrochemical series?
96. Write the similarities of VB theory and crystal field theory?
97. Draw the structure of $[\text{Cr}(\text{CO})_6]$.
98. HF is a liquid while HCl is a gas. Explain.
99. Draw the structure of ClF_3 .

100. What are the types of halogens?

SECTION-B (5 Marks)

1. What are the characteristics of precipitating agents?
2. Write a note on co-precipitation.
3. Explain Linkage and ligand isomerism with examples.
4. Write the postulates of Werners theory.
5. Explain the d-orbital splitting in tetrahedral complexes.
6. Explain the structure and properties of $\text{Ni}(\text{CO})_4$.
7. How will you estimate Al^{3+} ion using oxine?
8. Discuss the basic nature of iodine.
9. Write the preparation and structure of ICl and BrF_3 .
10. Draw and Explain the block diagram of DTA instrument.
11. Explain the principle of gravimetric analysis with example.
12. What are chelating ligand? Explain in Detail.
13. Explain the optical isomerism in square planar complexes.
14. Discuss Werners theory of coordination compound with suitable example.
15. How does crystal field theory explain the magnetic properties and colour of the co-ordination complex?
16. For the carbonyls given below give one method of preparation, important properties and structure.
17. How does valence bond theory differ from crystal field theory?
18. Discuss about comparative study of halogens.
19. Explain the exceptional properties of fluorine.
20. Give the applications of thermogravimetry.
21. What are the advantages and disadvantages of using organic precipitants?
22. Describe a method of detection of the complexes.
23. Describe the applications of EDTA in coordination chemistry.
24. Explain the postulates of VBT.

25. Give the comparison between VBT and CFT.
26. How do Cu and Cd ions are separated?
27. Compare the chemical properties of halogens?
28. Describe the preparation, properties and structure of para periodic acid.
29. Explain the principles of gravimetric analysis.
30. What are the principles of TG and DTA?
31. What ligands? How are they classified? Give an example for each type?
32. What are the applications of EDTA?
33. Discuss about Werner coordination theory?
34. Briefly explain the magnetic properties and colour of the Complexes by using CFT?
35. Compare the properties of F, Cl, Br, I.
36. What are the interhalogen compounds? Give examples.
37. What are the conditions for precipitation?
38. Explain the TGA thermogram of silver nitrate.
39. Explain geometrical isomerism in 6 co-ordinated complexes.
40. Describe the application of EDTA.
41. Explain Werner theory of co-ordination compounds.
42. Explain the crystal field splitting of d orbitals in an octahedral complexes.
43. Explain the structure of $\text{Fe}(\text{CO})_5$.
44. What are the carbonyls? How are they classified?
45. Explain the anomalous properties of fluorine.
46. What are the advantages of precipitating from homogeneous medium?
47. Give an account of the applications of TGA.
48. Write short notes on the effect of chelation in metal complexes.
49. Explain about DTA.
50. What are the limitations of CFT?

SECTION-C (10 Marks)

1. Describe the block diagram of the instrument of DTA.
2. Discuss the factors which affect DTA curves.
3. Write a brief study of geometrical isomerism of 6- coordinated complexes.
4. Write a brief notes on:
 - (i) Magnetic properties of complexes using CFT.
 - (ii) trans effect.
5. How will you separate Cu and Cd ions in solution?
6. Explain the structure and properties of $\text{Cr}(\text{CO})_6$.
7. Write a brief notes on :
 - (i) pseudo halogens
 - (ii) classification of halides.
8. Explain the basic principles of TG and DTA.
9. Define the term specific precipitant and sequestering agents.
10. Explain different types of structural isomerism in co-ordination compounds with examples.
11. Describe the splitting of d orbital in octahedral and tetrahedral field with suitable diagram.
12. How Ni^{2+} ion is estimated by using DMG?
13. What are the application of co-ordination compounds?
14. Write a note on:
 - (i) Interhalogen compounds
 - (ii) Oxides of halogens.
15. What are the technique used to full fill the conditions of precipitation?
16. What are the application of DTA and TGA?
17. What are specific and selective precipitants?
18. Write a short note on co-ordination isomerism and linkage – isomerism.

19. Discuss optical isomerism in 4 and co-ordinated complexes.
20. Explain the crystal field splitting in octahedral and tetrahedral complexes.
21. What are the application of co-ordination compounds in qualitative and quantitative analysis?
22. What are the important properties and structure of $\text{Cr}(\text{CO})_6$?
23. What are pseudohalogens? Explain their reactions.
24. Explain the basic properties of halogens.
25. Explain the construction and working of DTA instrument with a neat sketch.
26. Briefly explain the stereochemistry of complexes with coordination number 6.
27. How nickel is estimated as Ni-DMG? Give the structure of Ni-DMG complex.
28. What are the interhalogens compounds? How are they prepared?
29. Write a note on thermometric titration.
30. Discuss the detailed nomenclature of coordination complexes.
31. Write a note on compounding P and AS as acceptor ligands.
32. Write a short note on the following :
 - (i) sequestering agents
 - (ii) Co-precipitation
 - (iii) Post precipitation
 - (iv) selective precipitation
33. Distinguish between VBT and CFT of co-ordination complexes.
34. Explain the separation of Cu and Cd ions in qualitative analysis.
35. Compare and contrast the properties of halogens.
36. What are the co precipitation and post precipitation? Explain with suitable example.
37. What are the precaution needed in the use of thermobalance?
38. Define chelation and briefly explain the classification and uses of chelates.
39. How will you estimate aluminium using oxine?
40. Discuss the preparation and structure of $\text{Cr}(\text{CO})_6$.

41. Give a comparative account F and O.
42. Write a note on fluorides of oxygen.
43. What are specific and selective precipitants? Explain with examples.
44. Describe the principle of thermometric titration with an example.
45. What are chelates? Explain the effects of chelation .How chelates are used in chemical analysis?
46. Explain with examples the linkage isomerism and coordination isomerism.
47. Write a account on werner coordination theory.
48. Explain the bonding and structure of carbonyls formed by iron and cobalt.
49. Write notes on the compounds of arsenic as acceptor ligands.
50. (i) How cement is manufactured?
(ii) What are the constituents of paints? Explain their functions?

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER -I
SUB: Organic Chemistry-I (BCH 52)**

SECTION-A (2 Marks)

UNIT 1: CARBOHYDRATE

1. What is mean by epimersation?
2. Write structure of sucrose and glucose
3. Write structure of pyranose and furanose
4. What is means by mutarotation?
5. What is carbohydrate?
6. Write the classification of carbohydrate
7. How will you distinguish between glucose and sucrose?
8. What is means by reducing and non reducing?
9. What is disaccharide give example?
10. What is polysaccharide give example
11. Write the structure of cellulose.
12. Write osazone derivative of glucose
13. Fructose react with nitric acid give the product
14. What is cellulose acetate?
15. Fructose react with HCN the product
16. What is anomers?
17. What is mean by glycosidic linkage
18. Glucose react with acetic anhydride give the product
19. What is mean by chain lengthening and chain shortening
20. Write the use of cellulose derivative

UNIT 2: STEREOISOMERISM

21. What is means by conformation analysis.
22. What are condition for the compound to be optical activity.
23. Draw the newmann projection formulae of different conformation of ethane.
24. How will you differentiate the geometrical isomers?
25. Write the Fischer's structure for D-(+)-glyceraldehyde.
26. Assign R and S notation to alaine.
26. Write the structure for (Z) 2-butene.
27. Write staggered conformation for 1,2-dichloroethane
28. Write rules for R and S configuration.
29. Draw the cis and trans isomerisation for 1,2 diphenylethane
30. Draw the structure for maleic and fumaric acid.
31. What is torsional strain.
32. Draw the energy level digrame for cyclohexane

33. write the R and S configuration for alaine.
34. Explain Biphenyl is optical active.
35. What is dihedral angle.
36. Draw the chair and boat for cyclohexane.
37. What is syn and anti notation.
38. 1,2 hexanediol which for is more stable.
39. Draw the structure for allene and spirane.
40. Draw the cis and trans for 1,3 dimethylcyclohexane

UNIT 3: TAUTOMERISM:

41. What is witting reaction?
42. How many acidic hydrogens are in malonic ester?
43. Write the keto-enol tautomerism in malonic ester.
44. What is active methylene group? Give two examples.
45. What is meant by aldol condensation?
46. Define keto-enol tautomerism.
47. Define a carbonyl polarization.
48. What is amido-imidol tautomerism.
49. What is nitro- acinitro tautomerism.
50. Draw the structure for cyanoaectic esters.
51. What is Michael reaction?
52. What is perkin reaction?
53. What is claisen condensation?
54. Write preparation for aectoacetic ester.
55. Write knoevenagol reaction
56. What is cannizzaro reaction?
57. Write reformatsky reaction.
58. What is tautomerism.
59. What is alphahydrogen?
60. Write preparation for malonic ester.

UNIT 4: HETEROCYCLIC COMPOUND:

61. Explain " Electrophilic substitution mainly takes place at position 2- of pyrrole.
62. What are the uses of piperidine?
63. How is furan prepared? Give its uses.
64. Write any two reactions of isoquinoline.
65. Write the Huckel's rule for aromatic compound.
66. Basicity arrangement of heterocyclic compound.
67. Write any two preparations of pyrrole.
68. Write diazocoupling reaction of pyrrole.
69. Write Kolbe schmit reaction of pyrrole.
70. Write reimer timmer reaction of pyrrole.
71. Write the diel's alder reaction of furan.
72. Explain mannich reaction of indole.

73. Write any two nucleophilic reaction of indole.
 74. Write Fischer synthesis of indole.
 75. Explain Skurrup synthesis of quinoline.
 76. Draw the structure of isoquinoline and indole.
 77. Write any two chemical reactions of pyridine.
 78. Write any two chemical reactions of quinoline.
 79. Draw the structure of Furan.
 80. Draw the structure of Pyridine and piperidine.
- UNIT-V POLYNUCLEAR HYDROCARBON**
81. What is aromatic? Give two examples.
 82. Write the resonance structures of Naphthalene.
 83. Write the resonance structures of Anthracene.
 84. Write the resonance structures of Phenanthrene.
 85. Why α product more predominant than β product in naphthalene?
 86. Write any 2 oxidation reactions of naphthalene.
 87. Write any 2 reduction reactions of naphthalene.
 88. How does anthracene react with sulphuric acid?
 89. What is dye?
 90. What is auxochrome?
 91. What is chromophore?
 92. Write the classification of dye.
 93. What is malachite green?
 94. What is moderate dye?
 95. What is Vat dye?
 96. Write the preparation of Methyl orange.
 97. What is diazomethane?
 98. Write any 2 the preparation of Diazomethane.
 99. Draw the structure of Diazomethane.
 100. Write the preparation of Diazoacetate.

SECTION-B (5 Marks)

UNIT 1: CARBOHYDRATE

1. How will you convert glucose into fructose?
2. How will you convert an aldohexose into an aldopentose?
3. How could fructose react with excess of phenyl hydrazine?
4. Bring out the inter conversion of ketose to aldose.
5. Discuss the mutarotation of glucose.
6. Explain any five properties of glucose with equations.
7. Elucidate the straight chain structure of glucose.
8. Write a note on the following
 - (i) Epimers
 - (ii) Anomers
9. How could glucose react with excess of phenylhydrazine? Write the mechanism.
10. Explain Kiliani synthesis

UNIT 2: STEREOISOMERISM

11. Explain E,Z notation with specific example.
12. Find out R and S notation for the following compound.
 - (i) Tartaric acid
 - (ii) Glycine
13. Note on stereochemistry of biphenyl and substituted Biphenyls.
14. Explain the optical activity of allenes.
15. Illustrate with example
 - (i) Sawhorse.
 - (ii) New mann projection formula.
16. Describe the cahn-ingold-prelog rules for R,S notation.
17. Explain the asymmetric synthesis.
18. Write a note on stereo chemistry of spiranes.
19. Explain the geometrical isomerism exhibited by maleic and fumaric acid.
20. Conformation analysis of cyclo hexane.

3: UNIT TAUTOMERISM

21. Explain the mechanism of aldol condensation.
22. Explain the mechanism of Knoevenagel reaction.
23. Explain aceto acetic ester as synthetic reagent.
24. Explain Perkin reaction with mechanism.
25. Explain the reactivity of carbonyl group.
26. Write the Nitro-acinnitro tautomerism.
27. Write any two synthetic products from ethyl acetoacetic ester. Give reactions.
28. Give the mechanism of Reformatsky reaction.
29. Explain "Malonic ester as synthetic reagent".
30. Explain the mechanism of Michael reaction.

UNIT 4: HETEROCYCLIC COMPOUND

31. Explain Hofmann exhaustive methylation reaction.
32. Write the chemistry of quinoline.
33. Explain the chemistry of furan.
34. Describe Bischler-Napieralski synthesis.
35. Discuss the reaction of indole.
36. Explain the aromaticity of any five heterocyclic compounds.
37. Explain the chemistry of pyrrole.
38. Explain the chemistry of isoquinoline.
39. Explain the nucleophilic reaction of pyridine
40. Discuss the reaction of thiophene.

UNIT-V POLYNUCLEAR HYDROCARBON

41. Write the synthesis of alizarin.
42. Write the synthesis of malachite green.
43. Explain the electrophilic reaction of anthracene.

44. What are vat dye? Give an example. How is it prepared.
45. Discuss the preparation and any three properties and uses of diazomethane.
46. Discuss the oxidative property of naphthalene.
47. Describe the method of preparation and the method of application of methyl orange.
48. Discuss the major reaction of naphthaquinones.
49. Explain the electrophilic substitution reaction of naphthalene.
50. What is fluorescene dye? Give an example with preparation.

SECTION-C (10 Marks)

UNIT 1: CARBOHYDRATE

1. Explain chemical properties of glucose.
2. How does cyclic structure of fructose account for mutarotation?
3. Elucidate the structure of sucrose.
4. Discuss the chemical property of fructose.
5. Elucidate the structure of glucose.
6. Describe the method for determining size of the glucose.
7. Elucidate the structure & derivative of cellulose.
8. Discuss the configuration of glucose.
9. Explain chain lengthening & shortening of carbohydrate.
10. Carbohydrate Give example.

UNIT 2: STEREOISOMERISM

11. Explain the conformational analysis of n-butane with energy diagrams.
12. How will you differentiate Maleic Acid and Fumaric acid?
13. Explain conformational energy diagram for ethane.
14. Discuss the any five methods of distinguishing geometrical isomers.
15. Write notes on the following:
 - (a) Conformers.
 - (b) Dihedral angle.
 - (c) E & Z notations.
16. Sketch and explain the various conformations of 1, 3- dimethyl cyclohexane and compare their stabilities.
17. Explain the conformational analysis of cyclo hexane with energy diagrams.
18. Write the R & S configuration of the following compound.
 - (a) Alanine
 - (b) Ribose
 - (c) 1, chloro-1- hydroxy-1- methyl methane
 - (d) Deoxy ribose.
19. Explain E & Z and syn & anti geometry
20. Explain optical activity of Biphenyl, Allenes, Spirane.

3: UNIT TAUTOMERISM

21. Starting from ethylacetoacetate, suggest routes for the synthesis of:
 - (i) Ethylmethyl malonic acid.
 - (ii) 2-methyl butanoic acid.
 - (iii) Ethyl-3-amino butanoate
 - (iv) Succinic acid
22. Explain the Wittig reaction with mechanism.
23. Explain the Cannizzaro reaction with mechanism.
24. Explain the mechanism of following reactions:
 - (a) Knoevenagel reaction.
 - (b) Michael reaction.
25. Describe any four synthetic applications of Malonic ester, ethylacetoacetic ester.
26. Explain optical activity of carbonyl compound.
27. Bring out the Claisen condensation.
28. How are the following compounds prepared from malonic ester?
 - (a) Adipic acid
 - (b) Crotonic acid
 - (c) Barbituric acid
 - (d) Cyclopentane carboxylic acid.
29. Explain keto-enol tautomerism.
30. Write notes on acetoacetic ester.

UNIT 4: HETEROCYCLIC COMPOUND

31. Explain the reaction of pyridine:
 - (i) Chichibabin reaction
 - (ii) Nitration
 - (iii) Friedel-Craft's reaction
 - (iv) Sulphonation.
32. Pyrrrole how will you prepare the following from it?
 - (a) 2-nitro Pyrrrole
 - (b) 2,5-dihydro Pyrrrole
 - (c) Pyrrolidine
 - (d) Pyrrrole-2-sulphonic acid.
33. Explain the chemistry of Pyridine.
34. What are the methods available for opening the heterocyclic rings?
35. Write notes on the following:
 - (i) The oxidation-reduction of piperidine.
 - (ii) Van Braun's method.
36. (A). Compare the basicity of pyrrole, pyridine, piperidine and aniline.
 (B). Explain the chemistry of piperidine.
37. Explain the following reactions of indole.
 - (a) Mannich reaction.
 - (b) Friedel-Craft acylation.
 - (c) Reimer-Tiemann reaction.
 - (d) Bromination.
38. Explain the chemistry of quinoline.
39. Explain the chemistry of thiophene.

40. Explain the chemistry of furan.

UNIT-V POLYNUCLEAR HYDROCARBON

41. Discuss the preparation of following dyes.

- (a) Methyl orange
- (b) Malachite green
- (c) Phenolphthalein
- (d) Indigo

42. How is diazoacetic ester synthesized? Give some of its synthetic uses.

43. Elucidate the structure of anthracene.

44. (a) How is anthrax quinines dyes prepared?

(b) Give the synthetic uses of diazo acetic ester.

45. Discuss about oxidation of reaction of Naphthalene and Anthracene.

46. (a) How is azo dyes prepared? Give example.

(b) Explain the chemistry of Naphthalene.

47. Elucidate the structure of pheanthrene

48. Write note on diazomethane.

49. What is dyes? Explain classification of dyes.

50. Explain the chemistry of Naphthaquinones.

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER -I
SUB: Physical Chemistry-I (BCH 53)**

SECTION –A (2 Marks)

1. State and explain Henry's law? (November 2010, Apr/May 2015, Nov/Dec 2015)
2. What are azeotropes? (November 2010, Nov/Dec 2011, Apr/May 2015, Apr/May 2016)
3. Define Van't Hoff factor? (November 2010, April 2012)
4. What are colligative properties? Name four such properties? (November 2010, Apr/May 2015)
5. Write Gibbs phase rule equation and explain the terms involved in it? (November 2010)
6. What are essential features of a freezing mixture? (November 2010)
7. Explain heterogeneous catalysis with an example? (November 2010)
8. Discuss two applications of adsorption? (November 2010, April 2012)
9. Define rate and rate constant of a reaction? (November 2010)
10. Bring out the differences between the order and molecularity of a reaction? (November 2010)
11. State and explain Raoult's law? (April 2011)
12. Write and explain Duhem – Margules equation? (April 2011)
13. Define Van't Hoff isochore? (April 2011)
14. Calculate the degree of freedom for the following:
 - a) A mixture of nitrogen and oxygen gases contained in a vessel
 - b) Rhombic sulphur in equilibrium with monoclinic sulphur. (April 2011)
15. Define Eutectic mixture and Eutectic temperature? (April 2011)
16. Discuss the characteristics of enzyme catalytic reactions? (April 2011, Nov/Dec 2011)
17. Explain the term chemisorption? (April 2011)
18. What is meant by zero order reaction? Write mathematical expression for zero order reaction? (April 2011)
19. Explain the term semi permeable membrane? (April 2011)
20. The rate constant for a first order reaction is $1.54 \times 10^{-3} \text{ s}^{-1}$. Calculate its half life time? (April 2011)

21. Define the term critical solution temperature? (Nov/Dec 2011)
22. State Le Chatelier principle? (Nov/Dec 2011)
23. State the law of mass action? (Nov/Dec 2011, Apr/May 2015, Nov/Dec 2015)
24. What is meant by congruently melting compounds? (Nov/Dec 2011, Apr/May 2016)
25. What is meant by peritectic reaction? (Nov/Dec 2011)
26. Give any two examples of enzymes catalysis? (Nov/Dec 2011)
27. What are the limitations of collision theory? (Nov/Dec 2011, Apr/May 2015)
28. Define ideal solution? (April 2012)
29. What are real solutions? (April 2012)
30. Write the equation that relates the mole fraction of the solute and lowering of vapour pressure of a solution? (April 2012)
31. Why we write the reduced phase rule $F = C - P + 1$ (April 2012)
32. Give four examples for systems that have eutectic point? (April 2012)
33. Why we need BET theory? (April 2012)
34. The half life time of the homogeneous gaseous reaction $\text{SO}_2\text{Cl}_2 \rightarrow \text{SO}_2 + \text{Cl}_2$, which obeys first order kinetics is 8.0 minutes. Calculate the rate constant? (April 2012)
35. What is triple point? (Apr/May 2015)
36. Define the following terms: a) Phase b) Component. (Apr/May 2015)
37. What is an adsorption isotherm? (Apr/May 2015)
38. Distinguish between homogeneous and heterogeneous catalysis? (Apr/May 2015)
39. Define order of a reaction? (Apr/May 2015)
40. What is meant by adsorption? How are they classified? (Apr/May 2015)
41. Define the term freezing point and depression point? (Apr/May 2015)
42. What is meant by freezing mixtures? Give examples? (Apr/May 2015)
43. What are the limitations of Nernst distribution law? (Apr/May 2015)
44. What are partially miscible liquids? Give examples? (Apr/May 2015)
45. What is meant by consecutive and parallel reaction? Give examples for each? (Apr/May 2015)
46. Define order and molecularity? (Apr/May 2015)
47. What is meant by catalysis? (Apr/May 2015)
48. What is reverse osmosis? (Nov/Dec 2015)
49. Define the term Degrees of freedom? (Nov/Dec 2015)
50. What is reduced phase rule? (Nov/Dec 2015)

51. Explain Nernst distribution law? (Nov/Dec 2015)
52. Define zero order reaction? (Nov/Dec 2015)
53. Give any two examples for parallel reaction? (Nov/Dec 2015)
54. Write any two applications of Le Chatelier principle? (Nov/Dec 2015)
55. Define Osmotic pressure? (Apr/May 2016)
56. What are adsorption isotherm graph? (Apr/May 2016)
57. Define the term phase? (Apr/May 2016)
58. Explain solvent extraction? (Apr/May 2016)
59. Define activation energy? (Apr/May 2016)
60. How will you determine the order of a reaction by fractional change method? (Apr/May 2016)
61. What is equilibrium constant? (Apr/May 2016)
62. Define standard free energy change? (Apr/May 2016)

SECTION-B (5 Marks)

1. What are the factors that affect solubility of a gas in a liquid? (Nov 2010)
2. Draw and explain the vapour pressure composition diagram for ideal solutions? (Nov 2010)
3. Derive a relation between the lowering of vapour pressure and osmotic pressure? (Nov 2010, Nov/Dec 2011)
4. Give the thermodynamic derivation of law of chemical equilibrium? (Nov 2010)
5. Describe the experimental determination of phase diagram of two component system by method of cooling curves. What are the limitations? (Nov 2010)
6. Write a note on polymorphism? (Nov 2010)
7. Distinguish between physical adsorption and chemical adsorption? (Nov 2010)
8. Derive an expression for the rate of an acid catalyzed reaction? (Nov 2010)
9. How is order of a reaction determined by graphical method? (Nov 2010)
10. Discuss the effect of catalyst on the rate of a reaction? (Nov 2010)
11. Write a note on azeotropes? (Apr 2011)
12. What is meant by solubility curve? Explain the following terms,
 - i) Continuous solubility curve
 - ii) Discontinuous solubility curve (Apr 2011)
13. Describe any one method for the determination of elevation in boiling point of a solution? (Apr 2011)

14. Write a note on Le Chatelier principle? (Apr 2011)
15. Discuss Mg – Zn system and its features? (Apr 2011)
16. Describe briefly a two component system labelled diagram which involves compound formation with incongruent melting point? (Apr 2011)
17. What are the adsorption isotherms? Show different types of adsorption isotherm with the help of diagrams? (Apr 2011)
18. Discuss the factors which influence adsorption of gases by solids? (Apr 2011)
19. How is order of a reaction determined by manometry method? (Apr 2011)
20. Discuss the effect of temperature on the rate of the reaction? (Apr 2011, Apr/May 2015)
21. State and explain Henry's law? (Nov/Dec 2011)
22. Derive Gibbs Duhem Margules equation? (Nov/Dec 2011)
23. State and explain the laws of osmosis? (Nov/Dec 2011)
24. Give definition for the following, Give an example to each case,
i) Phase ii) Component (Nov/Dec 2011)
25. Draw schematically the phase diagram of water system and apply Gibbs phase rule in it? (Nov/Dec 2011, Apr/May 2015, Apr/May 2016)
26. How chemisorption differs from physisorption? (Nov/Dec 2011, Apr/May 2015, Nov/Dec 2015)
27. Define the terms adsorption, adsorbate, adsorbent, absorption and chemisorption. (Nov/Dec 2011)
28. Derive the integrated rate equation for the first – order reaction? (Nov/Dec 2011)
29. Give four examples of second – order reactions. Write the units of rate constant. (Nov/Dec 2011)
30. Discuss the partially miscible liquid system having the upper critical solution temperature? (Apr 2012)
31. Write notes on the effect of impurities on critical solution temperature? (Apr 2012)
32. State and explain the law of mass action and the law of chemical equilibrium? (Apr 2012)
33. Draw and discuss the phase diagram of ferric chloride – water? (Apr 2012)
34. Draw and explain the phase diagram of Na – K system? (Apr 2012, Apr/May 2015)
35. Discuss carefully the general characteristics of catalytic reaction? (Apr 2012, Apr/May 2015)

36. Explain clearly what is meant heterogeneous catalysis? Give examples heterogeneous catalysis involving gaseous reactants? (Apr 2012)
37. Discuss in detail the collision theory of bimolecular reactions? (Apr 2012)
38. Discuss in detail the activated complex theory of bimolecular reaction. (Apr 2012)
39. State and explain Raoult's law? (Apr/May 2015)
40. Derive Gibbs – Duhem equation? (Apr/May 2015)
41. Write a note on osmotic pressure? (Apr/May 2015)
42. Derive Van't Hoff reaction isotherm? (Apr/May 2015, Nov/Dec 2015)
43. Write a note on freezing mixtures? (Apr/May 2015)
44. What is half-life period? Derive the half-life period for a second order reaction? (Apr/May 2015)
45. What are colligative properties? Explain with examples? (Apr/May 2015)
46. Briefly explain Freundlich adsorption isotherm (Apr/May 2015, Apr/May 2016)
47. Draw and explain the phase diagram of Lead – Silver system? (Apr/May 2015)
48. Discuss about azeotropic mixtures? (Apr/May 2015)
49. What are ideal solution and non – ideal mixture? (Apr/May 2015)
50. Write the Arrhenius equation. Explain the effect of temperature on reaction rate? (Apr/May 2015)
51. Write the rate constant for the first, second, third and zero order reaction? (Apr/May 2015)
52. State and explain Le Chatelier principle and its applications? (Apr/May 2015)
53. Write a note on Van't Hoff isochore? (Apr/May 2015, Apr/May 2016)
54. Explain the determination of molecular weight of a solute by cryoscopy method? (Nov/Dec 2015)
55. Derive Gibbs phase rule? (Nov/Dec 2015)
56. Draw and explain the phase diagram of sulphur system? (Nov/Dec 2015)
57. Discuss the variation of mutual solubility of phenol – water system? (Nov/Dec 2015)
58. Write a note in fractionating distillation? (Nov/Dec 2015)
59. Explain the dilatometric method to measuring kinetics of a reaction? (Nov/Dec 2015)
60. Derive Arrhenius equation on reaction rate? (Nov/Dec 2015)
61. Describe the synthesis of ammonia by Le Chatelier principle? (Nov/Dec 2015)

62. How will you determine the osmotic pressure? (Apr/May 2016)
63. Write a note on Pattinsons process of desilverization? (Apr/May 2016)
64. Explain the phenol – water system of critical solution temperature? (Apr/May 2016)
65. Give an account of i) Raoult's law ii) Henry's law (Apr/May 2016)
66. Explain the consecutive and parallel reactions? (Apr/May 2016)
67. Derive the rate constant for first order reactions? (Apr/May 2016)
68. Explain the mechanism of enzyme catalysis? (Apr/May 2016)

SECTION-C (10 Marks)

1. What is critical solution temperature? Describe the different types of partially miscible liquids? (Nov 2010)
2. Explain Lechatlier principle with examples? (Nov 2010)
3. Discuss the salient features of lead – silver system? (Nov 2010, Nov/Dec 2015)
4. What is the basic principle of BET equation? How can BET equation be used for the determination of surface area of an adsorbent? (Nov 2010)
5. Compare collision theory with absolute reaction rate theory? (Nov 2010)
6. Draw boiling point – composition diagrams for liquid mixtures and explain? (Apr 2011, Nov/Dec 2011)
7. Derive Vant Hoff equation for the temperature dependence of equilibrium constant? (Apr 2011)
8. Draw the labelled diagram of $\text{FeCl}_3 - \text{H}_2\text{O}$ system. Describe the important features? (Apr 2011)
9. Discuss the mechanism and kinetics of heterogeneous catalytic reaction with a suitable example? (Apr 2011)
10. Discuss collision theory of reaction rates? (Apr 2011)
11. What is molal freezing point depression constant of a solvent? Derive the relation between the freezing point depression of a solution and the mole fraction of the dissolved solute? (Nov/Dec 2011)
12. Discuss the phase diagram of lead – silver system. Explain the significance of this system a connection with desilverization of lead? (Nov/Dec 2011)
13. Derive Michalis – Menten equation for enzyme catalysis? (Nov/Dec 2011)
14. Discuss the following methods for determination of order of reaction,
 - a) Half – life method

- b) Use of differential equations
 - c) Graphical method (Nov/Dec 2011)
15. Discuss the principle of fractional distillation of miscible liquid pairs? (Apr 2012)
16. Derive thermodynamically the relationship between molality and the elevation of boiling point? (Apr 2012)
17. Draw and explain the phase diagram of sulphur system. Apply phase rule to the sulphur system and find out the degrees of freedom? (Apr 2012)
18. Discuss briefly Langmuir unimolecular theory of adsorption. Derive an expression for Langmuir adsorption isotherm? (Apr 2012, Nov/Dec 2015)
19. Write notes on the following physical methods, generally used for study reaction kinetics,
- a) Manometric method
 - b) Dilatometric method (Apr 2012)
20. a) What are ideal solutions? Explain their derivations from ideal behavior?
b) Write a note on CST of phenol – water system (Apr 2015)
21. a) Derive thermodynamically law of chemical equilibrium
b) Derive Vant Hoff factor for dissociation (Apr 2015)
22. a) Draw and explain the phase diagram of lead – silver system
b) Write a note on thermal analysis curves. (Apr 2015)
23. a) Derive Michalis – Menten equation
b) Describe any two applications of adsorption (Apr 2015)
24. a) How is order of a reaction determined by half – life period method?
b) Compare collision theory with ARRT theory? (Apr 2015)
25. a) What meant by elevation of boiling point? How is it determined?
b) What are the difference between chemical and physical adsorption?
(Apr 2015)
26. a) State and explain phase rule
b) Draw and explain the phase diagram of a water system (Apr 2015)

27. State and explain Raoult's law, Henry's law and Nernst distribution law?
(Apr 2015)

28. a) Explain dilatometric method with suitable example

b) Derive an expression for the rate constant of a bimolecular reaction on basis of collision theory. (Apr 2015)

29. Explain the mechanism and kinetics of enzyme catalysis? (Apr 2015, Apr 2016)

30. Derive Michaelis – Menten equation (Nov/Dec 2015)

31. a) Write a note on Applications of Nernst distribution law

b) Explain temperature composition diagram of Toluene – Benzene.
(Nov/Dec 2015)

32. Describe the transition state theory of reaction rates. In what way is this theory superior to the collision theory? (Nov/Dec 2015)

33. What are the differences between physical adsorption and chemical adsorption? (Apr/May 2016)

34. Describe in detail the thermal analysis and cooling curves with neat sketch?
(Apr/May 2016)

35. State Nernst distribution law. Discuss its applications? (Apr/May 2016)

36. Derive the rate constant of a bimolecular reaction using Arrhenius theory?
(Apr/May 2016)

**KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY**

**B.Sc., CHEMISTRY
SEMESTER -I
SUB: Elective-Analytical Chemistry-I (BECH 54A)**

SECTION –A (2 Marks)

1. Define Spectrum.
2. What is electromagnetic radiation?
3. What is translational energy?
4. What is rotational energy?
5. What is vibrational energy?
6. What is electronic energy?
7. Write the formula in translational energy with example.
8. Write the formula in rotational energy with example.
9. Write the formula in vibrational energy with example.
10. Write the formula in electronic energy with example.
11. State Born- Oppenheimer approximation.
12. What are types of electromagnetic radiation.
13. State the selection rule for a molecule to be microwave active.
14. What is microwave spectroscopy?
15. Write the selection rule microwave spectroscopy.
16. How will you calculate bond length.
17. How will you calculate moment of inertia.
18. Write the principle of microwave spectroscopy.
19. Write the formula in rotational constant.
20. Define electromagnetic radiation.
21. What is UV-VISIBLE spectroscopy?

22. Write the region between UV-VISIBLE spectroscopy.
23. Define absorption law.
24. What are type of absorption law.
25. Define Lambert law.
26. Define Beer law.
27. Define Beer-Lambert law.
28. What is photo colorimeter?
29. What is spectrophotometer?
30. What is electronic transition?
31. What are type of electronic transition?
32. What is $\sigma\text{-}\sigma^*$ transition? Give examples?
33. What is $n\text{-}\sigma^*$ transition? Give examples.
34. What is $\pi\text{-}\pi^*$ transition? Give examples.
35. What is $n\text{-}\sigma^*$ transition? Give examples.
36. What is chromophore?
37. What is auxochromophore?
38. Give any two example of chromophore.
39. Give any two example of auxo chromophore.
40. What is absorption?
41. What is intensity?
42. What is hyper chromic effect? Give example.
43. What is hypo chromic effect? Give example.
44. What is Batho chromic effect? Give example.
45. What is hypeso chromic effect? Give example.
46. What is Red shift? Give example.

47. What is Blue shift? Give example.
48. What are the factors affecting absorption band intensity?
49. What is IR spectroscopy?
50. What are types of IR spectroscopy.
51. Write the region between near IR spectrum.
52. Write the region between middle IR spectrum.
53. Write the region between far IR spectrum.
54. What is the principle of IR spectroscopy?
55. What is the selection rule in IR spectroscopy?
56. What is the fingerprint region in IR spectroscopy?
57. What is the common point to the sample in IR spectroscopy?
58. What is H-bonding?
59. Define H-bonding.
60. What are types of H-bonding?
61. What is inter H-bonding?
62. What is intra H-bonding?
63. How will you identify the strength of H-bonding from shift of IR frequency.
64. Define mode of vibration?
65. What is mode of vibration?
66. Calculate the mode of vibration in carbon dioxide?
67. Calculate the mode of vibration in water?
68. Calculate the mode of vibration in HBr?

69. Calculate the mode of vibration in benzene?
70. Define stretching vibration.
71. What is stretching vibration.

72. What is symmetry stretching vibration.
73. What is Asymmetry stretching vibration.
74. Define bending vibration.
75. What is bending vibration
76. What are type of stretching vibration.
77. What are type of bending vibration.
78. What is scissoring vibration?
79. What is rocking vibration?
80. What is wagging vibration?
81. What is twisting vibration?
82. What are the sample used in IR spectrum?
83. What are the radiation sources used in IR spectrum?
84. What are solid sample used in IR spectrum?
85. What are liquid sample used in IR spectrum?
86. What are gas sample used in IR spectrum?
87. What are solution sample used in IR spectrum?
88. What is stock line?
89. What is Antistock line?
90. What is raman scattering?
91. What is rayleigh scattering?
92. What is raman line?
93. What is rayleigh line?
94. What is rayleigh scattering?
95. What is mutual exclusion principle.
96. Define mutual exclusion principle.
97. Difference between raman line and rayleighline.

98. Difference between raman scattering and Rayleigh scattering.

99. What is rotational raman spectra?

100. Difference between stock line and antistockline.

SECTION –B (5 Marks)

1. How will you calculate bond length from microwave spectrum.

2. Explain the quantisation of rotational energy.

3. Explain the quantisation of vibrational energy.

4. Explain the quantisation of translational energy.

5. Explain the quantisation of electronic energy.

6. Write note on electromagnetic radiation.

7. Write note on microwave spectroscopy.

8. Calculate the moment of inertia rigid diatomic rotor with bond distance 130 pm and

reduced mass 2×10^{-26} .

9. The moment of inertia of diatomic molecule of reduced mass 4×10^{-26}

What is internuclear distance.

10. Explain the quantisation of any two energy level.

11. Write note on UV-VISIBLE spectroscopy.

12. Discuss about absorption law.

13. Increase in polarity of solvent shift $\pi-\pi^*$ and $n-\sigma^*$ to shorter wavelength comment on the statement.

14. What are the difference type intensity shifts in UV spectrum.

15. Discuss about photometer.

16. Discuss about spectro photometer.

17. Write note on type of electronic transition.

18. Write note on Lambert law.

19. Write note on Beer law.

20. Write note on Beer-Lambert law.

21. Write note on chromophore.
22. Write note on auxochromophore.
23. Write note on absorption band and intensity.
24. Discuss about IR spectroscopy.
25. Discuss about principle IR spectroscopy.
26. Calculate the C-H stretching vibration frequency from the following data
 $K=5 \times 10^5$
 Mass of C = 20×10^{-2}
 Mass of H = 1.6×10^{-2}
27. What are the mode of vibration in linear CO molecule.
28. What are the mode of vibration in linear HBr molecule.
29. What are the mode of vibration in non linear water molecule.
30. Write any five application of IR spectroscopy.
32. What are the mode of vibration in non linear CO molecule.
33. Write note on sample techniques of liquid in IR spectroscopy.
34. Write note on sample techniques of gas in IR spectroscopy.
35. Write note on sample techniques of solid in IR spectroscopy.
36. Write note on sample techniques of solution in IR spectroscopy.
37. Discuss about expression for vibrational frequency.
38. Write note on stretching and bending vibration.
39. Write note on classification of stretching vibration.
40. Write note on classification of bending vibration.
41. Calculate the wave number of stretching vibration of C-C double bond . $K= 10 \times 10^5$
42. What are the different mode of vibration?
43. Write note on sample technique in IR spectroscopy.
44. Write note on H-bonding.

45. Write note on finger print region.
46. Write note on mutual exclusion principle.
47. Discuss the difference between raman and ir spectroscopy.
48. Explain about mutual exclusion principle.
49. Write note on stock and and stockline.
50. Write note on rayleish raman scattering.

KRISHNASAMY COLLEGE OF SCIENCE, ARTS AND MANAGEMENT FOR WOMEN
DEPARTMENT OF CHEMISTRY

B.Sc., CHEMISTRY
SEMESTER -I
SUB: Pharmaceutical Chemistry (BECH 55A)

SECTION –A (2 Marks)

UNIT I:

1. Define the term “drug”
2. What are the causes for jaundice.
3. What is pharmacopoeia?
4. What is a pharmacophore?
5. Mention the symptoms of jaundice?
6. What is vaccine?
7. Define pharmacology.
8. What is meant by chemotherapy?
9. Write the characteristic malaria.
10. Name some vegetables rich in iron
11. Write characteristic of drug.
12. What is pharmacodynamic?
13. Different between Bacteria and virus.
14. Write mechanism of action of drug.
15. What is pharmacology?
16. Mention the symptoms of malaria.
17. What are the causes for filarial?
18. What are antidotes?
19. Write any four first aid.
20. What are items present in first aid box.

UNIT II:

21. What are the symptoms for diabetics?
22. What are the symptoms for anemia?
23. What are the uses of sembaruthi?
24. Give the uses of neem.
25. Mention any two medicinal value of adadodai
26. Give the uses of tulasi
27. Mention the uses of kizhanelli.
28. Write the characteristics of anemia.
29. Classification of anemia
30. Classification of diabetics.

31. Urine test for diabetes.
32. Write any two uses of semparuthi
33. Write any four uses of thoothvelai.
34. Define molish, s tes for sugar
35. What is insulin?
36. What is hyperdiabetes?
37. What is hypodiabetes?
38. Mention any two medicinal value of mango.
39. How is control of anemia
40. Write the diagnostic test for sugar.

UNIT-III

41. Give two examples for sulpha drugs.
42. Write the names of any two chlorinated phenols.
43. Classify the following into antiseptic or disinfectants.
44. Define antibiotics.
45. Mention the uses of sulphathiazole.
46. Write a note on penicillin.
47. Preparation of sulphathiazole.
48. Preparation of sulphafurazole.
49. Preparation of protosil.
50. What is antiseptic?
51. Difference between antiseptic and disinfectants.
52. What is cationic surfactant.
53. Disadvantage of chloroform.
54. Draw the structure of penicillin.
55. Draw the structure of streptomycin.
56. Draw the structure of chloramphenicol.
57. What is disinfectants.
58. Write any two uses of chloramphenicol.
59. Write the uses of penicillin.
60. Write the uses of streptomycin.

UNIT-IV

61. What is the meaning of AIDS?
62. Define antipyretics.
63. Name any two anti-inflammatory agents.
64. Draw the structure of aspirin.
65. What is analgesics?
66. Write action of analgesics.
67. What is non-narcotic drug? give example.
68. List the adverse effects of pethadine.

69. What is paracetamol? Give its uses.
70. Define narcotic analgesics.
71. Classification analgesics.
72. Draw the structure of morphine.
73. Draw the structure of ibuprofen.
74. What is cancer?
75. Explain AZT,DDC.
76. Write derivative of morphine.
77. Draw the structure of heroine.
78. Draw the structure of codaine.
79. Write the preparation of methyl salicylate.
80. Write the preparation of paracetamol.

UNIT-V

81. Define anaesthetics.
82. What is local anaesthetics?
83. Write any two anaesthetics.
84. What is general anaesthetics?
85. Classification of anaesthetics.
86. Mention the uses of ether.
87. Write the of chloroform.
88. What is the function of prophylactic agents?
89. Name the two major types of anaesthetics.
90. Give example for psychedelic drugs.
91. What is LSD?
92. What is tranquilizers?
93. What is sedatives and hypnotics?
94. Uses of diethyl ether.
95. Uses and Disadvantage of cyclopropane.
96. Disadvantage of chloroform.
97. Uses and disadvantage of nitrous oxide.
98. Uses and disadvantage of trichloroethylene.

99. Draw the structure of cocaine.
100. Uses and disadvantage of cocaine.

SECTION –B (5 Marks)

UNIT-I

1. Write about the causes of retention jaundice.
2. Explain the causes and symptoms of cholera.
3. How is malaria caused? give its symptoms.

4. Write notes on first aid for accidents.
5. Define the following terms
 - i. Pharmacophore
 - ii. Pharmacopoeia.
6. What are the causes, symptoms and drug for filariasis.
7. Difference between bacteria and virus.
8. Explain action of drug.
9. Write the properties of drugs.
10. Explain the storage of drugs.

UNIT-II:

11. What are the medicinal uses of “kizhanelli”
12. Indicate the uses of semparuthi and adadodai plants.
13. What are the causes for diabetes? How is it controlled?
14. How sugar in serum and urine determined?
15. Give the diagnostics test for sugar and cholesterol in blood sample.
16. Mention the symptoms and causes of jaundice.
17. What are the causes for diabetes? How is it controlled?
18. Write briefly about oral hypoglycaemic agents.
19. Write about the medicinal properties of tulasi.
20. Write about the medicinal properties of thoothvelai.

UNIT-III

21. Explain the structure and uses of chloramphenicol.
22. Write about the importance of antibiotics.
23. Briefly explain the structure and uses of streptomycin.
24. Explain the mode of action of penicillin.
25. Mention the action and uses of sulphathizole.
26. What are antibiotics? How are they classified? give examples.
27. What are antiseptics and disinfectants? give their uses.
28. Discuss the importance of cationic surfactants.
29. Mention the action and uses of sulphafurazole.

30. Mention the action and uses of prontosil.

UNIT-IV

31. What are analgesics? Mention their types write examples.
32. What are the causes of AIDS? Write a note on treatment of AIDS.
33. What is aspirin? Mention its uses and disadvantages?
34. Discuss the mode of action of morphine.
35. Write about the immunology phenomena of salicylates.
36. Write shorts notes on ether.
37. Write notes on narcotic drugs.
38. Write notes on non narcotics drugs.

39. Explain antipyretics and anti inflammatory agents.
40. What are the causes of cancer? Write a note on treatment of cancer.

UNIT-V

41. What are tranquilisers? Give two examples and write their effects.
42. What do you know by trichloroethylene?explain.
43. Write a short note on hypnotics.
44. What are anaesthetics? How are they classified? Give an example for each type.
45. Write the uses and disadvantage of ether and nitrous oxide.
46. Write the ideal characteristics of an anaesthetic agent.
47. Write a note on chloroform.
48. Write a note on sedatives drugs.
49. Explain psychedelic drugs.
50. Explain LSD hashish and their effects.