

DEPARTMENT OF CHEMISTRY
Govt. Degree College (A)(W), SRIKAKULAM
SEMESTER - I
Course I: Course I: Essentials and applications of Mathematical, Physical and
Chemical sciences
(Code: 23BSPM11)
(w.e.f. 2023-24)

Hours: 5hrs/week

Credits: 4

Time: 3 hours

Maximum Marks: 60

PART- A

Answer any five of the following questions. Each question carries Four marks. $5 \times 4 = 20$ Marks

1. Find the square root of $-5 + 12i$ [Synthesis/ Evaluate]
2. Find the Mean, Mode and Median of the following data
1, 5, 10, -8, 6, 11, 10 [Synthesis/ Evaluate]
3. What is F.P.S system and explain about it [Analysis]
4. Write a short note on Electric field [Knowledge/Remember]
5. What are sources of Carbohydrates [Knowledge/Remember]
6. What is the role of fat in the human body [Analysis]
7. Write the differential equation that describe the motion of the Pendulum [Application]
8. What is that formula that describe the radioactive decay [Application]
9. Write a short note on URL [Analysis]
10. What is anti-virus. Give some examples it. [Analysis]

PART- B

Answer all the following questions. Each carries Eight marks

$5 \times 8 = 40$ Marks

11. (a) Prove that (1) $\sin 18^\circ = \frac{\sqrt{5} - 1}{4}$ (2) $\cos 36^\circ = \frac{\sqrt{5} + 1}{4}$ [Knowledge/Remember]
(Or)

(b) Find the locus of P satisfying the equation
 $|z + 4i| + |z - 4i| = 10$ [Knowledge/Remember]

12. (a) What are applications of acoustic waves [Understanding/
Comprehension]

(Or)

(b) What is the first law of thermodynamics. Explain its significance [Understanding/
Comprehension]

13. (a). What are proteins and explain their role in the human body [Knowledge/Remember]
(Or)

(b) Write a note on vitamins (Knowledge / Remember)

14. (a) Write a note on applications of Calculus in physics (Applications)

(Or)

(b) Write a note on applications of differential equations in chemistry (Applications)

15. (a) Discuss about the evolution of computers (Understanding / Comprehension)

(Or)

(b) What are various types of networks and explain about them (Understanding / Comprehension)

DEPARTMENT OF CHEMISTRY
Govt. Degree College (A)(W), SRIKAKULAM
SEMESTER END EXAMINATIONS MODEL PAPER
SEMESTER - 1 (w.e.f. 2023-24)

Course 2: Advances in Mathematical, Physical and
Chemical sciences
(Code: 23BSPM12)

Maximum Marks: 60

Time: 3 hours

PART- A

Answer any five of the following questions. Each question carries Four marks. $5 \times 4 = 20$ Marks

1) Convert $2x+5y = 5$ into intercept form. Find the points of intersection of this line with coordinate axes

2) Calculate the value of $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$

3) What are the technologies that are used to obtain energy from tides

4) What are the advantages of renewable energy

5) What are applications of nano-sensors

6) What is computer aided drug design

7) What are sources of solid wastes

8) What is biomechanics

9) Explain Hexadecimal system with examples

10) Convert binary number 11101 into decimal system

PART- B

Answer all the following questions. Each carries Eight marks

$5 \times 8 = 40$ Marks

11. (a) Find $\int e^{ax} \sin bx dx$ [Knowledge/Remember]

(Or)

(b) If A, B are invertible matrices then show that $(AB)^{-1} = B^{-1} A^{-1}$

[Knowledge/Remember]

12. (a) Explain different modes of energy storage [Knowledge/Remember]

(Or)

(b) What are quantum dots and give applications [Knowledge/Remember]

13. (a). Explain dye removal using catalysis methods [Understanding/ Comprehension]

(Or)

(b) Explain impact of chemical pollutants on ecosystem

[Understanding/ Comprehension]

14. (a). What is green technology? How does it work and give types, adoption and examples of green technology [**Understanding/ Comprehension**]

(Or)

(b) Write a note on nuclear medicine [**Understanding/ Comprehension**]

15. (a) What is the difference between analogue and digital signal. Describe differences between them [**Application**]

(Or)

(b) Convert the following decimal numbers into binary form

(1) 243, (2) 45, (3) 77, (4) 89 [**Application**]

GOVERNMENT COLLEGE FOR WOMEN(AUTONOMOUS), SRIKAKULAM

MODEL PAPER

FIRST YEAR B.Sc HONOURS CHEMISTRY : MAJOR

SEMESTER-II

GENERAL AND INORGANIC CHEMISTRY COURSE-3

MAX MARKS: 60

TIME:3 Hrs

PART-A

5X8=40Marks

Answer All of the following questions . Each carries EIGHT Marks.

1. (a) Explain Bohr's theory ?
(Or)
(b) Describe the arrangement of elements in the periodic table and IUPAC Nomenclature ?
2. (a) Explain the factors favouring the formation of ionic compounds?
(Or)
(b) Explain about Born- Haber cycle?
3. (a) Explain about Valence bond theory?
(Or)
(b) Draw the M.O Diagram for homo and hetero nuclear diatomic molecules N_2 and CO ?
4. (a) Explain Band theory of metals.
 - i) Free Electron theory
 - ii) Valence bond theory
(Or)
(b) Explain Intra and Inter molecular Hydrogen bonding?
5. (a) Explain principle and importance of HSAB and also Pearson's concept?
(Or)
(b) Explain the theories of Acids and Bases.
 - i) Arrhenius theory
 - ii) Bronsted-lowry theory

PART-B

5X4=20Marks

Answer any **FIVE** of the following questions. Each carries **FOUR** marks.

6. Explain Heisenberg uncertainty principle?
7. Explain Hund's Rule?
8. What are Electron Affinity and electronegativity?
9. What is Lattice Energy?
10. Explain VSEPR Model for NH_3 and XeF_4 ?
11. Write about Geometry of molecules BeCl_2 and PCl_5 ?
12. Define semiconductors and insulators?
13. What is Vanderwaals Forces?
14. Define pH , pK_a , pK_b ?
15. Define and classify protic and aprotic solvents?

TIME:3 Hrs

MAX MARKS: 60

PART-A

Answer All of the following questions . Each carries EIGHT Marks.

5X8=40Marks

1. (a) Explain Preparation and structure of Diborane?

(Or)

(b) Explain preparation ,Classification and uses of silicones?

2. (a) Explain the classification and structure of oxides and oxoacids of sulphur?

(Or)

(b) Explain the preparation and structure of Interhalogen compounds?

3. (a) Explain the characteristic of d-block elements with special reference to electronic configuration ?

(Or)

(b) What are magnetic & catalytic properties of d-block elements and ability to form complexes ?

4. (a) What is Lanthanide contraction? Explain consequences of Lanthanide Contraction ?

(Or)

(b) Explain the Separation of Lanthanides by ion -exchange Method?

(a) Explain about Nuclear reactions?

(Or)

(b) Define and Explain the Radioactivity?

PART-B

5X4=20Marks

Answer any **FIVE** of the following questions. Each carries **FOUR** marks.

6. Explain the structure of Borazine?
7. Explain the preparation & structure of phosphonitrilic compounds?
8. Write a note on Pseudohalogens?
9. Explain characteristic of group 16 element ?
10. Explain stability of various oxidation states of 3d series ?
11. Explain about variable valence of d- Block elements ?
12. Explain actinide contraction ?
13. Write about magnetic properties of lanthanides ?
14. Explain applications of radio activity?
15. What is n/p ratio and binding energy?

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), SRIKAKULAM

MODEL PAPER

FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR

SEMESTER-III

FUNDAMENTAL IN ORGANIC CHEMISTRY Course-5

Maximum Marks: 60M

Time: 3 hours

PART-A

5X8=40 Marks

Answer ALL the questions. Each carries **EIGHT** Marks

1. (a). What is mesomeric effect. Give its applications.

(Or)

(b). Write about the Factors influencing of Polarization of Covalent bonds.

2. (a). Explain Baeyer's strain theory.

(Or)

(b). Explain the Cyclohexane conformation with energy diagram

3. (a). Explain the Hydration form of carbonyl compounds, Alkylation and terminal Alkynes.

(Or)

(b). Explain General methods and preparations of Unsaturated hydrocarbons.

4. a). Give the mechanism for nitration of benzene.

(Or)

b). Explain the mechanism of Electrophilic aromatic substitution of Friedal-Crafts

alkylation

5. (a). Explain Huckel rule. Give examples.

(Or)

(b). Explain the Orientation of Aromatic substitution of ortho, para, meta directing group

PART -B

4X5=20Marks

Answer any **FIVE** questions . Each carries **FOUR** Marks

6. Explain the Inductive effect.
7. Explain the Resonance effect.
8. Explain Saytzeff's rule.
9. What are the physical and chemical properties of Alkanes.
10. Explain Benzenoid and non-benzenoid compounds.
11. Explain the Markownikoff addition reaction and mechanism.
12. Explain the Friedel- Crafts Acylation.
13. Write about the Electrophilic Aromatic substitution of Halogenation and Nitration.
14. Explain the acidity of 1-Alkynes.
15. Give any two preparation methods of Benzene.

GOVERNMENT COLLEGE FOR WOMEN (A), SRIKAKULAM
MODEL PAPER
FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR
SEMESTER-III
ORGANIC CHEMISTRY COURSE-6

Maximum Marks: 60

Time: 3 hours

PART-A

5X8=40 Marks

Answer ALL the questions. Each carries EIGHT Marks

1.(a) Explain the preparation of Alkyl halides from

(i) Alkanes (ii) Alkenes (iii) Alcohols

(Or)

(b) Explain the Nucleophilic substitution reactions of SN_1 and SN_2 with mechanisms.

2.(a) Explain the 1,2,3 Alcohols from Grignard's reagent.

(Or)

(b) Explain Pinacol - Pinacolone rearrangement with mechanism.

3.(a) Explain the following Reactions & Mechanisms

(i) Aldol Condensation

(ii) Cannizzaro reaction

(Or)

(b) Explain the Nucleophilic Addition Reaction with HCN , $NaHSO_3$ and Alcohols.

4.(a) Explain the preparation methods of Monocarboxylic acids.

((Or)

(b) Explain the following reactions.

(i) Arndt - Eistert's synthesis

(ii) Hunsdiecker's Reaction

5.(a) Explain the classification and Biological Importance of Monosaccharides.

(Or)

(b) Explain the Disaccharides - Haworth structure of Maltose, Lactose & Sucrose

PART -B

4X5=20Marks

Answer any **FIVE** questions. Each carries **FOUR** Marks.

6. Explain the Sandmeyer's reaction.
7. Explain the Nucleophilic aromatic substitution with example of benzene mechanism.
8. What is Bouveault- Blanc reaction.
9. Explain mechanism of Reimer- Temann reactions.
10. Explain the Haloform reaction.
11. Explain the preparation of Acid chlorides.
12. Explain the Curtius Rearrangement reaction.
13. Explain the Hell-Volhard Zelinsky reaction.
14. Explain the structural Elucidation of Glucose.
15. What are the Mutarations.

GOVERNMENT COLLEGE FOR WOMEN (A), SRIKAKULAM
MODEL PAPER
FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR
SEMESTER-III
PHYSICAL CHEMISTRY COURSE-7

Maximum Marks:60

Time :3Hours

PART-A

5x8=40Marks

Answer ALL of the following questions. Each carries EIGHT marks.

1. A. Explain CST and Effect of impurity on consolute temperature

(Or)

B. Derive Nernst distribution law and explain it

2. A. Explain Colligative properties and write any two properties

(Or)

B. Explain Van't of HOFF factor and derive it

3. A. Explain laws of photo chemistry

1. Grothus-draper's law

2. Stark-Einstein's law

(Or)

B. Explain Quantum yield and give two examples

4. A. Explain Kohlrausch's law and its applications

(Or)

B. Explain Debye-Huckel-Onsager's for Strong & Weak electrolyte

5. A. What is Electro chemical cell and explain types of electrodes with examples

(Or)

B. Explain Potentiometric titrations in detail

Part B

4x5=20marks

Answer any **five**. Each carries on four marks.

6. Explain Rault's law
7. Explain liquid's-phenol-water system
8. Explain Cottrell's method
9. What is Ostwald-walker method
10. What is photosensitized reactions.
11. Explain types of conductometric titration
12. Explain phosphorescence reaction.
13. Define transport number.
14. What is single electrode potential.
15. Draw the Gas electrode and explain it.

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), SRIKAKULAM
MODEL PAPER

FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR
SEMESTER-III

INORGANIC AND PHYSICAL CHEMISTRY Course-8

Maximum Marks: 60

Time: 3 hours

PART-A

5X8=40 Marks

Answer ALL the questions. Each carries EIGHT Marks

1. (a). Explain the important postulates in VBT?

(Or)

- (b). Write briefly about crystal field splitting in Octahedral complexes.

2. (a). Explain SN^1 and SN^2 .

(Or)

- (b). Explain the Trans Effect. Give its Applications

3. (a). What is 18 Electron Rule? Explain with Examples.

(Or)

- (b). Draw molecular orbital Energy Diagram of CO Molecule

4. a). Prove $C_p - C_v = R$.

(Or)

- b). Explain about Kirchhoff's equation.

5. (a). Explain the Entropy Change in Spontaneous and Equilibrium reactions.

(Or)

- (b). Explain Carnot cycle.

PART -B

4X5=20Marks

Answer any FIVE questions . Each carries FOUR Marks

6. Write the important postulates in Werner's Theory.
7. Explain types of reactions takes place in complexes .
8. What is Labile and Inert complexes .
9. What are state fuctions and internal energy.
10. Explain the Isothermal and Adiabatic process.
11. Write a short note on Entropy.
12. Explain Mole Ratio method.
13. Write a short note on Factors effecting metal complexes.
14. Write a short note on Joule-Thomson effect.
15. Explain second law of Thermodynamics.

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), SRIKAKULAM
MODEL PAPER

FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR
SEMESTER-IV

PHYSICAL CHEMISTRY-II COURSE-9

Maximum Marks:60

Time: 3Hours

PART-A

5x8=40Marks

Answer all of the following questions. Each carries EIGHT Marks

1. (a) Explain the postulates of kinetic of gases (Exclude derivation).

(Or)

(b) Derive the relationships between critical constants and Vander wall's constants.

2. (a) Briefly explain temperature variation of viscosity of liquids and comparison with that of Gases.

(Or)

(b) Explain the classification of liquid crystals into Smectic and Nematic

3. (a) Explain the Bragg's law and its derivation

(Or)

(b) Write about the Law of Rationality of Indices

4. (a) Explain the Gibbs phase rule

(Or)

(b) Explain the following two systems

(i) Pb-Ag system desilverisation of Lead

(ii) NaCl- Water system

5. (a) Explain the definition classification of Colloids

(Or)

(b) Write about physical and chemical adsorption

PART-B

Answer any FIVE of the following questions. Each carries **FOUR** Marks

5x4=20 Marks

6. Explain Joule-Thomson Effect
7. Explain the Andrew's Isotherms of carbon dioxide
8. Explain the physical properties of liquids
9. Difference between liquid crystal and solid/liquid
10. Explain the Bravais lattices and crystal system
11. Write the X-ray diffraction and crystal structure
12. What are Freezing mixture
13. Write about the concept of phase
14. Write about the Gold Number
15. Write the applications of adsorption

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), SRIKAKULAM
MODEL PAPER

FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR
SEMESTER-IV

GENERAL AND PHYSICAL CHEMISTRY-COURSE-10

Maximum Marks:60

Time: 3Hours

PART-A

5x8=40Marks

Answer all of the following questions. Each carries EIGHT Marks

1. (a) Explain the molecular Representations Wedge, Fischer, Newman and Saw-Horse formula
(Or)
(b) Briefly explain the definition of Enantiomers and Diastereomers
2. (a) Explain the classification of elements according to their action in biological system
(Or)
(b) Explain the Toxicity of following metal ions. Reason for toxicity
(i) Hg (ii) Pb (iii) Cd (iv) As
3. (a) Explain the factors effecting degree of ionization, ionization constant and ionic product of water
(Or)
(b) Briefly explain the indicators -Theories of acid-base indicators, selection indicators.
4. (a) Explain the effect of temperature, pressure, catalyst and other factors on reaction rates.
(Or)
(b) Write the general methods for determination of order of a reactions.
5. (a) Explain the concept of activation energy and its calculation from Arrhenius equation
(Or)
(b) Write about the Michaels- Menten equation-derivation , significance of Michaels- Menten constant.

PART-B

5x4=20Marks

Answer any **FIVE** of the following questions. Each carries **FOUR** Marks

6. Explain the optical activity
7. Explanation of optical isomerism with two examples.
(i) Glyceraldehyde (ii) Lactic acid
8. Explain the Iron and its application in bio systems.
9. What is the metal ions present in biological system.
10. Explain the P^H scale .
11. Write the Buffer solutions, Henderson's.
12. Explain the Derivation of integrated rate equations for zero.
13. Explain the concept of reaction rates.
14. Explain the Inhibitors and lock and key model .
15. Explain the enzyme catalysis

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), SRIKAKULAM

MODEL PAPER

FIRST YEAR B.Sc HONOURS CHEMISTRY: MAJOR

SEMESTER-IV

NITROGEN CONTAINING ORGANIC COMPOUNDS AND SPECTROSCOPY- COURSE-11

Maximum Marks:60

Time: 3Hours

PART-A

5x8=40Marks

Answer all of the following questions. Each carries EIGHT Marks

1. (a) Explain the distinction between primary, secondary and tertiary amines using Hinsberg's method and nitrous acid
(Or)
(b) Preparation and Synthetic applications of diazonium salts including preparation of following compounds.
(i) Arenes (ii) Phenols (iii) Cyano and nitro compounds
2. (a) Explain the definition and Classification of amino acids into alpha, beta and gamma amino acids
(Or)
(b) Write about the Zwitter ion structure, salt like character solubility and melting points
3. (a) Explain the following reactions
(i) Nef Reaction (ii) Mannich Reaction
(Or)
(b) Explain the nomenclature and classification of nitro alkanes
4. (a) Explain the Furan, Thiophene and Pyrrole aromatic character- Preparation from- 1,4 Di carbonyl compounds Paul-Knorr synthesis.
(Or)
(b) Explain the Electrophilic Substitution at 2 (or) 5 position halogenations, Nitration and Sulphonation.
5. (a) Explain the selection rules for electronic spectra
(Or)
(b) Explain the IR Spectra of alkanes, alkenes and simple alcohols [Inter and intra molecular hydrogen bonding.

PART-B

Answer any **FIVE** of the following questions. Each carries **FOUR** Marks

5x4=20Marks

6. Explain the Gabriel synthesis
7. Write about the coupling reactions of diazonium salts
8. Explain the definition of Isoelectric points
9. Explain the strecker's synthesis
10. Explain Micheal addition and Reduction
11. Explain the preparation of Nitroalkanes
12. Write about Diels-Alder reaction in Furan
13. Explain the Nucleophilic Substitution reaction
14. Explain the concept of chromophore and auxochrome
15. Write about Infrared Spectroscopy and types of molecular vibrations and Fingerprint region