# GOVERNMENT DEGREE COLLEGE (A), NAGARI
# CHITTOOR DISTRICT – 517 590
# DEPARTMENT OF CHEMISTRY

**SEMESTER - I**

**Course-1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

**Model Question Paper**

**Time: 1 1/2 Hrs.** **Max Marks: 75M**

## PART - A

**I. Answer All the following Questions.** **30 x 1 = 30 M**

**Multiple Choice**

S. No:01 to S. No:30

## PART-B

**II. Answer all the questions.** **5 x 5 = 25 M**

**Match the following (5 Sets)**

S. No:31 to S. No:35

| Group A | Group B |
|---|---|
| a) | 1) |
| b) | 2) |
| c) | 3) |
| d) | 4) |
| e) | 5) |

PART-C

**III. Answer all the questions**. **10 x 1 = 10 M**

**True or False**

S. No:36 to S. No:45

Question:

Answer: a) True b) False

PART-D

**IV. Answer all the questions**. **10 x 1 = 10 M**

**Fill in the Blanks**

S. No:46 to S. No:55

Question ----------(Fill the blank)

# GOVERNMENT DEGREE COLLEGE (A), NAGARI
# CHITTOOR DISTRICT – 517 590
# DEPARTMENT OF CHEMISTRY

**SEMESTER - I**

**Course-2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

**Model Question Paper**

**Time: 1 1/2 Hrs.** **Max Marks: 75M**

## PART - A

**I. Answer All the following Questions.** **30 x 1 = 30 M**

**Multiple Choice**

S. No:01 to S. No:30

## PART-B

**II. Answer all the questions.** **5 x 5 = 25 M**

**Match the following (5 Sets)**

S. No:31 to S. No:35

| Group A | Group B |
|---|---|
| a) | 1) |
| b) | 2) |
| c) | 3) |
| d) | 4) |
| e) | 5) |

## PART-C

**III. Answer all the questions**. **10 x 1 = 10 M**

**True or False**

S. No:36 to S. No:45

Question:

Answer: a) True b) False

## PART-D

**IV. Answer all the questions**. **10 x 1 = 10 M**

**Fill in the Blanks**

S. No:46 to S. No:55

Question ----------(Fill the blank)

# GOVERNMENT DEGREE COLLEGE (A), NAGARI
# CHITTOOR DISTRICT – 517 590
# DEPARTMENT OF CHEMISTRY

**SEMESTER - II**

**Course-2: GENERAL AND INORGANIC CHEMISTRY**

**Model Question Paper**

**Time: 3 Hrs.** **Max Marks: 75M**

## PART - A

**I. Answer All the following Questions** **10 x 1 = 10 M**

1. Give Schrodinger equation.
2. Define Hund's law.
3. Give an example for Ionic Compound.
4. What is Melting Point?
5. Give the full form for VSEPR.
6. What is the Bond Order of Nitrogen?
7. What is a conductor?
8. Give two examples for semi-conductors.
9. Give equation for $P_H$.
10. Give two examples for Strong Base.

## PART – B

**II. Answer any Five of the following Questions not exceeding 300 words each.** **5 x 5 = 25 M**

11. How the following Periodic properties vary in Group and Period?
    a) atomic radius b) electronegativity
12. What is inert-pair effect? Give an example for it.
13. Define Lattice energy. What are the factors that effect Lattice Energy?
14. What is Enthalpy of a reaction? What are endothermic and exothermic reactions?
15. Draw the Molecular orbital diagram of Nitrogen.
16. Give the postulates of Valency bond theory.
17. Define semi-conductor, Insulator. Give two examples for each.
18. Explain free electron Theory.
19. Give the Postulates of Arrhenius theory.
20. Define Hard acid and Hard base. Give two examples for each.

## PART – C

**III. Answer any FIVE of the following Questions not exceeding 1000 words each.** **5 x 8 = 40 M**

21. Explain Bohr Theory.
22. Derive Schrodinger equation
23. Explain Born-Haber cycle.
24. Explain the effect of Polarization on solubility, Melting point and thermal stability of ionic compounds.
25. Explain VSPER theory.
26. Explain M.O.T theory.
27. Explain Band theory.
28. Explain various types of hydrogen bonding.
29. Explain Bronsted-Lowry and Lewis theory.
30. Explain various types of reactions.

# GOVERNMENT DEGREE COLLEGE (A), NAGARI
# CHITTOOR DISTRICT – 517 590
# DEPARTMENT OF CHEMISTRY

**SEMESTER - II**

**Course-4: INORGANIC CHEMISTRY-I**

**Model Question Paper**

**Time: 3 Hrs.** **Max Marks: 75M**

## PART - A

**I. Answer All the following Questions** **10 x 1 = 10 M**

1. Give the structure for diborane.
2. What is the other name for Borazine.
3. Give an example for acidic oxide.
4. What is the formula of Caros acid.
5. Give the electronic configuration of Cr.
6. What is Adam's catalyst?
7. How lanthanides are separated?
8. Give the electronic configuration of Es.
9. Give one example for Isotope.
10. Name the fuel used in nuclear reactor.

## PART – B

**II. Answer any Five of the following Questions not exceeding 300 words each.** **5 x 5 = 25 M**

11. Give any three preparation methods of diborane.
12. Give ant three preparation methods of Phosphonitrilc chlorides.
13. Explain various oxyacids of Sulphur.
14. Explain the structure of Iodine Heptafluoride.
15. Explain variable oxidation states in d-block elements.
16. Explain catalytic properties of d-block elements.
17. What is lanthanide Contraction? Give it's consequences.
18. What is Actinide Contraction? Give it's consequences.
19. Define Isotope, Isobar, Isomer.
20. Explain Nuclear fission reaction.

## PART – C

**III. Answer any FIVE of the following Questions not exceeding 1000 words each.** **5 x 8 = 40 M**

21. Explain the structure of Phosphonitrilic chlorides.
22. What are Silicones? Explain their classification and preparation.
23. Explain various types of oxides.
24. Explain various types of interhalogen compounds with structure.
25. Explain magnetic and colour properties of d-block elements.
26. Explain Latimer diagram of Iron and Copper.
27. Give the differences between Lanthanides and Actinides.
28. Explain ion exchange method.
29. Give various applications of radioactive isotopes.
30. Explain the following a) n/p ratio b) Binding Energy.

Total No. of Pages : 2

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# FOUR YEAR B.Sc. DEGREE EXAMINATION, JANUARY - 2024

3-1-101A-R23

## CHOICE BASED CREDIT SYSTEM

## FIRST SEMESTER

## PART - I

## PAPER - I : ESSENTIALS AND APPLICATION OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

**(Common to Mathematics, Statistics, Chemistry, Computer Science, Data Science, Electronics and Physics)**

***(Under CBCS New Regulation w.e.f the academic year 2023-24)***

Time : 3 Hours

Max. Marks : 75

### SECTION - A

**Answer any Five of the following questions. Each question carries equal marks.** **(5×5= 25)**

1. Define Mechanics and discuss Newtonian Mechanics.
2. Draw a neat Diagram of Electromagnetic waves with labelled
3. Write a note on classification of matter with examples.
4. Give a list of Monosaccharides.
5. Write the importance of chemistry in Materials Science.
6. What is the role of physics in Aerospace industries?
7. Discuss the various types of Networks.
8. Write a note on Cryptography.
9. Find the modular and amplitude form of 3+2i
10. Find the vector product of vectors 2i+3j+4k and 3i+4j+2k.

### SECTION - B

**Answer All the questions. Each Question carries equal marks.** **(5×10=50)**

11. a) Discuss the laws of thermodynamics and significance

**(OR)**

b) Write a note on the following

i) Wave particle duality

ii) Nuclear particles

12. a) Discuss the Modern periodic table based on electronic configuration.

**(OR)**

b) Write a note on the following

i) Fats

ii) Vitamins

13. a) Write the applications of physics in the Electronics and semiconductor industry.

**(OR)**

b) Write the applications of chemistry in the Food and Beverage industry.

14. a) Define Internet and discuss role of internet in computer evolution

**(OR)**

b) Write a note on

i) Malware

ii) Fraud Techniques.

15. a) In triangle ABC, $\angle B = 90^\circ$ and BA =3, BC=4 and AC= 5 then find

i) All trigonometric ratios of angle B and

ii) Verify $\sin^2 B + \cos^2 B = 1$

**(OR)**

b) Find the mean, median and mode of the following data.

| Class interval | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|
| Frequency | 5 | 12 | 23 | 8 | 2 |

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[Total No. of Pages : 2

3-1-101B-R23

# FOUR YEAR B.Sc. DEGREE EXAMINATION, JANUARY - 2024

## CHOICE BASED CREDIT SYSTEM

## FIRST SEMESTER

## PART - II

## PAPER- II: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

**(Common to Mathematics, Statistics, Chemistry, Computer Science, Data Science, Electronics and Physics)**

***(Under CBCS New Regulation w.e.f the academic year 2023-24)***

**Time : 3 Hours** **Max. Marks : 75**

### SECTION - A

**Answer any Five of the following questions. Each question carries equal marks.** **(5×5=25)**

1. Write a note on Nanosensors.
2. Discuss impact of chemical pollutants on ecosystem.
3. Write a note on solid waste management.
4. Write the recent advances in biophysics.
5. Discuss energy efficient materials and devices.
6. Discuss application of medical physics.
7. Give detailed use of the Binary Number system on Advance level.
8. Define Signals and explain working of Digital Modem.
9. Find the point of intersection of the lines x+y=1 and x-y=3.
10. Find the derivative of the function $x^2e^x$

### SECTION - B

**Answer All the questions. Each question carries equal marks.** **(5×10=50)**

11. a) Write a note on Recent advances in the field of nanotechnology.

**(OR)**

b) Discuss about Quantum dots.

12. a) Write a note on Dye removal through the catalysis method.

**(OR)**

b) Discuss the impact of chemical pollutants on Human health.

13. a) Discuss Mathematical modeling applications in physics.

**(OR)**

b) Discuss Mathematical modeling applications in chemistry.

14. a) Write a note on the following Networking devices

i) Repeater

ii) Router.

**(OR)**

b) Write a note on the following Networking devices

1) Bridge

2) Hub

15. a) Evaluate the following integrals

i) $\int \sin^2 x \, dx$ *and*

ii) $\int (x^2+2x-3)^2(x+1)dx$

**(OR)**

b) Let $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ *and* $B=\begin{bmatrix}3 & 4\\ 5 & 6\end{bmatrix}$. Then verify that

i) $(AB)^T = B^T A^T$ and

ii) $\det(AB) = (\det A)(\det B)$

[Total No. of Pages : 2

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3-2-106A-R23

# FOUR YEAR B.Sc. HONOURS DEGREE EXAMINATION,

## JUNE/JULY -2024

## CHOICE BASED CREDIT SYSTEM

## SECOND SEMESTER - MAJOR

## PART - II : CHEMISTRY

## PAPER - 4 : GENERAL AND INORGANIC CHEMISTRY

*(Under CBCS New Regulation w.e.f. the academic year 2023-24)*

**Time : 3 Hours** **Max. Marks : 75**

### SECTION-A

Answer any **FIVE** of the following questions. Each question carries **equal** marks. **(5×5=25)**

1. Explain Heisenberg's uncertainty principle.
2. Write about the Schrodinger wave equation.
3. Write about the factors affecting lattice energy.
4. Explain Fajan's rule with suitable examples.
5. Explain Valence bond theory of covalent bond.
6. Write the differences between ionic compounds and covalent compounds.
7. Write the differences between conductors and insulators.
8. Explain hydrogen bonding and its types.
9. What is salt hydrolysis and give its types.
10. Define the terms $P^{H}$, $P^{ka}$ and $P^{kb}$.

## SECTION - B

Answer **All** the questions. Each question carries **10** marks. **(5×10=50)**

**11.** a) Write the postulates of Bohr's model of an atom and its limitations.

**(OR)**

b) Define the following terms

a) Ionization potential.

b) Electron affinity.

c) Electronegativity and

d) Inert - pair effect.

**12.** a) Explain the Born - Haber cycle enthalpy of formation of ionic compound.

**(OR)**

b) Explain about the factors favouring the formation of ionic compounds.

**13.** a) Draw the Molecular orbital diagram of $N_2$ and $O_2$ and give their bond order and magnetic properties.

**(OR)**

b) Define hybridization. Write the structures of the following compounds.

i) $BeCl_2$

ii) $BF_3$

iii) $CH_4$

iv) $PCl_5$ and

v) $SF_6$

**14.** a) Explain about the band theory of metals.

**(OR)**

b) Write the properties of hydrogen bonded N, O and F compounds.

**15.** a) Explain pearson's HSAB principle with suitable examples.

**(OR)**

b) Explain the liquid ammonia as a solvent in alkali and alkaline earth metal reactions.

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[Total No. of Pages : 2

3-2-106B-R23

# FOUR YEAR B.Sc. HONOURS DEGREE EXAMINATION,

## JUNE/JULY -2024

## CHOICE BASED CREDIT SYSTEM

## SECOND SEMESTER - MAJOR

## PART - II : CHEMISTRY

## PAPER - 4 : INORGANIC CHEMISTRY

*(Under CBCS New Regulation w.e.f. the academic year 2023-24)*

**Time : 3 Hours** **Max. Marks : 75**

### SECTION - A

Answer any **Five** of the following questions. Each question carries **equal** marks. **(5×5=25)**

1. Write about the structure of diborane.
2. Write any two preparations and uses of silanes.
3. Write the structures of oxy-acids of sulphur.
4. Write about the interhalogen compounds.
5. Write a note on catalytic property of d-block elements.
6. Write about the Latimer diagrams of transition elements.
7. Write about the oxidation states of actinides.
8. What is meant by lanthanide contraction and give its consequences.
9. Write about the radio active decay series.
10. Write the applications of radioactive isotopes.

### SECTION - B

Answer **All** the questions. Each question carries **10** marks. **(5×10=50)**

11. a) Write about the preparation and structure of Phosphonitrilic chloride $P_3N_3Cl_6$.

**(OR)**

b) What are Silicones? Give their general methods of preparation, properties and uses.

12. a) Explain the classification of oxides based on chemical behaviour and oxygen content.

**(OR)**

b) Explain about pseudohalogens, pseudohalides and their uses.

13. a) Explain the electronic configuration of 3d, 4d and 5d transition series.

**(OR)**

b) Write about the characteristics, variable valency and magnetic properties of d-block elements.

14. a) Explain the separation of lanthanides by ion exchange method.

**(OR)**

b) What are inner transition elements and explain electronic configurations of lanthanides and actinides.

15. a) Explain about Nuclear fusion and Nuclear fission.

**(OR)**

b) Explain about Soddy - Farjan's displacement law and stability based on n/p ratio.

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[Total No. of Pages : 3

3-5-106-7B-R20

# THREE YEAR B.Sc. DEGREE EXAMINATION, JANUARY - 2024

## CHOICE BASED CREDIT SYSTEM

## FIFTH SEMESTER

## PART - II : CHEMISTRY

## Paper - 7B : ANALYTICAL METHODS IN CHEMISTRY - 2

*(Under CBCS New Regulation w.e.f. the academic year 2022-23)*

Time : 3 Hours

Max. Marks : 75

Note : **This question paper contains two parts A and B.**
**Part-A is compulsory which carries 25 marks. Answer any five of the following questions in Part A.**
**Part-B consists of 5 Units. Answer one full question (A or B) from each unit (i.e., Q. No. 9 from Unit - I, Q. No. 10 from Unit - II, Q.No. 11 from Unit - III, Q.No. 12 from Unit - IV, Q. No. 13 from Unit - V). Each question carries 10 marks.**

### PART - A

భాగము – ఎ

**Answer any FIVE of the following questions. Each question carries equal marks.** **(5×5=25)**

1. What are the factors affecting $R_f$ values?

   $R_f$ విలువలను ప్రభావితం చేసే కారకాలు ఏమిటి?

2. Write a note on applications of thin layer chromatography.
   సన్నని పొర క్రోమాటోగ్రఫీ యొక్క అనువర్తనాలపై గమనికను వ్రాయండి.

3. Describe the various solvents used in paper chromatography.
   పేపర్ క్రోమాటోగ్రఫీలో ఉపయోగించే వివిధ ద్రావకాలను వివరించండి.

4. Write a few lines on solvents for eluting polar and nonpolar compounds.
   ఎల్యూటింగ్ (eluting) పోలార్ మరియు నాన్ పోలార్ సమ్మేళనాల కోసం ద్రావకాలపై కొన్ని పంక్తులను వ్రాయండి.

5. What do Ion exchange capacity?
   అయాన్ మార్పిడి సామర్థ్యం అంటే ఏమిటి?

6. Write a few applications of adsorption chromatography.
శోషణ క్రోమాటోగ్రఫీ యొక్క కొన్ని అనువర్తనాలను వ్రాయండి.

7. Define Beer - Lambert's law?
బీర్ – లాంబర్ట్ నియమమును నిర్వచింపుము.

8. Discuss the applications of emission spectroscopy in quantitative analysis.
పరిమాణాత్మక విశ్లేషణలో ఉద్గార స్పెక్ట్రోస్కోపీ యొక్క అనువర్తనాలను చర్చించండి.

## PART - B
భాగము – బి

(5×10=50)

Answer **All** the questions. Each question carries **equal** marks.

### UNIT - I

9. a) Define the term 'adsorbent' and how will you classify adsorbents used in adsorption chromatography.
'యాడ్సోర్బెంట్' అనే పదాన్ని నిర్వచించండి మరియు మీరు అధిశోషణ క్రోమాటోగ్రఫీలో ఉపయోగించే యాడ్సోర్బెంట్‌లను ఎలా వర్గీకరిస్తారు.

**(OR/లేదా)**

b) Write the various classification methods of chromatography based on phase and physical properties.
ప్రావస్థ మరియు భౌతిక లక్షణాల ఆధారంగా క్రోమాటోగ్రఫీ యొక్క వివిధ వర్గీకరణ పద్ధతులను వ్రాయండి.

### UNIT - II

10. a) Write about the types of paper chromatography in detail.
పేపర్ క్రోమాటోగ్రఫీ రకాల గురించి వివరంగా వ్రాయండి.

**(OR/లేదా)**

b) What are the steps involved in chromatographic technique?
క్రోమాటోగ్రాఫిక్ టెక్నిక్‌లో ఏ దశలు ఉంటాయి.

### UNIT - III

11. a) Draw a clear and labelled diagram of High pressure liquid chromatography. Explain the method in brief.
అధిక పీడన ద్రవ క్రోమాటోగ్రఫీ యొక్క స్పష్టమైన మరియు (లేబుల్ చేయబడిన) రేఖాచిత్రాన్ని గీయండి. పద్ధతిని క్లుప్తంగా వివరించండి.

**(OR/లేదా)**

b) Describe the principle involved in column chromatography and applications.
కాలమ్ క్రోమాటోగ్రఫీ మరియు అప్లికేషన్‌లలో ఉన్న సూత్రాన్ని వివరించండి.

## UNIT - IV

2. a) What is emission spectroscopy? What are the advantages and disadvantages of emission spectroscopy?
ఉద్గార స్పెక్ట్రోస్కోపీ అంటే ఏమిటి? ఉద్గార స్పెక్ట్రోస్కోపీ యొక్క ప్రయోజనాలు మరియు అప్రయోజనాలు ఏమిటి?

**(OR/లేదా)**

b) What is the process of excitation in emission spectroscopy? Discuss various excitation sources used in emission spectroscopy.
ఉద్గార స్పెక్ట్రోస్కోపిలో ఉత్తేజిత విధానము ఏమిటి? స్పెక్ట్రోస్కోపిలో ఉపయోగించే వివిధ ఉత్తేజిత మూలాలను చర్చించండి.

## UNIT - V

3. a) Describe the components of the spectrophotometer and discuss use of each component.
స్పెక్ట్రో ఫోటోమీటర్ యొక్క భాగాలను వివరించండి మరియు ప్రతి భాగం యొక్క ఉపయోగం గురించి చర్చించండి.

**(OR/లేదా)**

b) What is a spectrophotometer? How is it used in the analysis of multicomponent mixtures?
స్పెక్ట్రోఫోటోమీటర్ అంటే ఏమిటి? మల్టీకంపొనెంట్ మిశ్రమాల విశ్లేషణలో ఇది ఎలా ఉపయోగించబడుతుంది?

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