

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(Autonomous) Reaccredited by NAAC with 'A' Grade
(Affiliated to Mahatma Gandhi University)
(www.ngcnalgonda.org)

BOARD OF STUDIES 2017-18



DEPARTMENT OF CHEMISTRY

**NAGARJUNA GOVERNMENT COLLEGE,
NALGONDA**

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(AUTONOMOUS)

Re-accredited by NAAC with 'A' Grade

BOARD OF STUDIES - 2017-18

DEPARTMENT OF CHEMISTRY

NAGARJUNA GOVT.COLLEGE, (AUTONOMOUS) NALGONDA

DEPARTMENT OF CHEMISTRY

BOARD OF STUDIES MEETING

The members of Board of studies in Chemistry Department, N.G.College , Nalgonda met under the chairmanship of Sri P.Yedukondalu on 13-09-2017 and passed the following resolutions

AGENDA

1. To consider and approve the syllabus for B.Sc. - I, II, III years (I, II, III, IV, V & VI semesters) for the academic year 2017-18.
2. To consider and approve the choice based credit system (CBCS) and cumulative grade Point average (CGPA) system for I, II & III year students for the Academic year 2017-18
3. To Consider and approve the continuation of Internal Assessment for the Students admitted in to I, II & III year degree course during 2017-18.
4. To consider and approve the new syllabus for the CBCS and cumulative grade Point average (CGPA) System for the I & II Year Students as per the Mahatma Gandhi University, Nalgonda .
5. To consider and approve to conduct year wise practical Examination for III-year students and semester wise practical Examinations for the I & II Year students for the Year 2017-18.
6. To consider and approve the list of examiners for paper setting and evaluation for B.Sc. I, II & III years (I,II,III,IV,V&VI semesters) for the academic year 2017-18.
7. To consider and approve the model Question papers for B.Sc I, II and III Years for the academic year 2017-18.
8. To consider and approve the Skill Enhancement Compulsory Course (SECC) for II Year students from III semester in chemistry as per the syllabus prescribed by the Mahatma Gandhi University for the academic year 2017-18.
9. Any other related academic matter.

Resolutions

1. Unitization of syllabus in to 4 units for each paper.
2. CBCS and CGPA system are approved.
3. To conduct 2 Internal Assessments for 20 marks, one student seminar for 5 marks and one assignment for 5 marks (total 30 marks) for I , II & III year students .
4. As per MGU I & II year syllabus is approved.
5. Year wise practical examinations are approved for III year and semester wise Practical exams are approved for I & II year students.
6. List of the examiners are approved.
7. Model question papers are approved.
8. The Skill Enhancement Compulsory Course (SECC) for II Year students from III & IV semesters is approved
9. Internal examinations are conducted for 30 marks. Semester end exams are conducted for 70 marks, it is mandatory to get a minimum of 28 marks for one to get through it. On the whole for 100 marks one must get 40 marks to get through the paper.
10. To design question paper pattern in the following lines for I, II and III year students.

Section -A

5 X 2 = 10 Marks

- To give five very short questions and ask them to answer all questions

Section-B

4 X 5 = 20 Marks

- To give Six Short questions and ask them to answer any four questions

Section-C

4 X 10 = 40 Marks

- To give 4 Long Questions with internal choice and ask them to answer all question

1. To Prepare and supply of question banks and model papers to the students
2. Continuous Internal Assessment methods adopted to evaluate the progression of the

Student *Mamta, M.Sc. B.A.S*

Assistant Professor

Department of Chemistry

College for Women

G. S. S.

A. S. S.

M. S.

**APPROVED THE PANEL OF EXAMINERS FOR PAPER SETTING AND
EVALUATION FOR THE YEAR 2017-2018.**

SNO	PAPER		NAME	DISIGNATION	CELL NO
1	I	1	Dr. D. RAMESH	Assit.Prof., M.G.U, NLG	7702638320
2		2	Dr. V. RAVINDHAR REDDY	Assit.Prof., GDC, SIDDIPET	9492915339
3		3	Dr. CH. GOVERDHAN	Rtd. Assit.Prof.,	9848057671
4	II	1	Dr. M. JYOTHI	Assit.Prof., M.G.U, NLG	9951189583
5		2	Dr. D. RAMESH	Assit.Prof., M.G.U, NLG	7702638320
6		3	Dr. V. RAVINDHAR REDDY	Assit.Prof., GDC, SIDDIPET	9492915339
7	III	1	Dr. K. RAVINDRA CHARY	Assit.Prof., SVDC SURYAPET	9490570303
8		2	Dr. Y. PRASHANTHI	Assit.Prof., M.G.U, NLG	9010203857
9		3	Sri. D. KRISHNA KUMAR	Assit.Prof., GDC, JADCHARLLA, MBNR	9866219767
10	IV	1	Dr. Y. PRASHANTHI	Assit.Prof., M.G.U, NLG	9010203857
11		2	Dr. S. KALYANI	Assit.Prof., MGU, NALGONDA	9502388232
12		3	Dr. E. YADIAH	Assit.Prof., GDC, KAIRATHA BAD	9849535003
13	V	1	Dr. R. ROOPA	Assit.Prof., M.G.U, NLG	9441780972
14		2	Dr. A. SRINIVAS	Assit.Prof., KRR GDC, KODAD	9440140506
15		3	Dr. R. ASHOK REDDY	PRINCIPAL, GDC, NARAYANKED	9912644506
16	VI	1	Dr. A. SRINIVASULU	Assit.Prof., KRR GDC, KODAD	9440140506
17		2	Dr. K. RAVINDRA CHARY	Assit.Prof., SVDC SURYAPET	9490570303
18		3	Sri. YASAM SRINIVAS	ASSIT.PROF. KDC, HANAMKONDA	9885059533












19	VII	1	Dr. A. BHANU PRASAD	PRINCIPAL, GDC ,RAMANNAPET	9848385850
20		2	Sri. YASAM SRINIVAS	ASSIT.PROF. KDC, HANAMKONDA	9885059533
21		3	Dr. S. KALYANI	Assit.Prof MGU, NALGONDA	9502388232
22	VIII	1	Dr. A. SRINIVASULU	ASSIT.PROF. KRR GDC ,KODAD	9440140506
23		2	Dr. A. BHANU PRASAD	PRINCIPAL, GDC ,RAMANNAPET	9848385850
24		3	Sri. JANARDHANA SWAMY	LECTURER, GDC ,RAMANNAPET	9848482460

K Manjula
 Assistant Professor
 Department of Chemistry
 Govt. Degree College for Women
 NALGONDA

Gowd

Akhil prasad

CONSTITUTED BOARD OF STUDIES: 2017-2018

SL. NO	DESIGNATION	NAME	CELL NO	SIGNATURE
1	Chairman Board of studies	Sri. P. Yedukondalu, N.G College, Nalgonda	9849056316	
2	University Nominee	Dr. A. Bhanu Prasad, Principal, GDC, Ramanapet, Nalgonda.	9848385850	
3	Subject Expert (from outside)	Smt. K. Manjula Asst. Prof. of Chemistry GDC(w),Nalgonda	8143462182	
4	Subject Expert (from outside)	Dr. A. Srinivasulu Asst. Prof. of Chemistry KRR GDC, Kodad	9440140506	
5	Members: All The Faculty members of the Department	1. Sri. P. Ravi Kumar	9440208972	
		2. Dr. K. Venakata Krishana	9441993436	
		3. Sri. K. Ravi	9160616309	
		4. Dr. B. Bixamaiah	9440522563	
		5. Sri. K. Ravi kumar	9052999960	
		6. Smt. V. Bhavani	8019758494	
		7. Sri. P. Ramu	9912670252	
		8. Sri. B. Thirumalesha	9505562658	

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: 122 / BOS/chem/acad/2017-18

DATE : 07 - 09 - 2017

TO
Dr. A. Srinivasulu,
Asst. Prof. of Chemistry
KRR GDC Kodad.

**SUB:- Nagarjuna Govt. College, Nalgonda (Autonomous)-convening the meeting
of Board of studies - Chemistry on 13-09-2017- Intimation-Request-Reg.**

Sir,


I am happy to inform that you have been nominated as Subject Expert (from Outside) of Board of Studies in the Department of Chemistry of this college for the year 2017-18.

The meeting of the Board of studies, Chemistry will be held on 13-09-2017 in the Department of Chemistry to consider the following Agenda.

1. To approve the syllabus and model question papers for I, II, III, IV, V & VI semesters.
2. To approve the Introduction of Skill Enhancement Compulsory Course (SRCC) In the III & IV semesters.
3. To approve the internal assessment.
4. To approve the list of examinations for paper setting and evaluation.
5. Any other matter with permission of the chair.

You are requested to make it convenient to attend the meeting and extend your cooperation.


In-Charge /Chairman BOS
DEPARTMENT OF CHEMISTRY


Principal
Principal
Nagarjuna Govt. College
(Autonomous) NALGONDA.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: 123/BOS/chem/acad/2017-18

DATE : 07 - 09 - 2017

TO

Smt.K.Manjula,
Asst. Prof. of Chemistry
GDC(W) , Nalgonda-

**SUB:- Nagarjuna Govt. College, Nalgonda (Autonomous)-convening the meeting
of Board of studies - Chemistry on 13-09-2017- Intimation-Request-Reg.**


Sir,


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In-Charge /Chairman BOS
DEPARTMENT OF CHEMISTRY


Principal
Principal
Nagarjuna Govt. College
(Autonomous) NALGONDA.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: 124/ BOS/chem/acad/2017-18

DATE : 07 - 09 - 2017

TO
Dr. A. Bhanu Prasad.
Principal,
GDC Ramannapet ,

**SUB:- Nagarjuna Govt. College, Nalgonda (Autonomous)-convening the meeting
of Board of studies - Chemistry on 13-09-2017- Intimation-Request-Reg.**

Sir,


I am happy to inform that you have been nominated as University Nominee of Board of Studies in the Department of Chemistry of this college for the year 2017-18.

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In-Charge /Chairman BOS
DEPARTMENT OF CHEMISTRY


Principal
Principal
Nagarjuna Govt. College
(Autonomous) NALGONDA.

**NAGARJUNA GOVERNMENT COLLEGE :: NALGONDA
(AUTONOMOUS)
(Re-Accredited by NAAC with A Grade)**

Date: - 09 - 2017

To
The Principal
NG College
Nalgonda

Sir,

Sub: Grant of Autonomous status – Constitution of the Board of Studies
in Chemistry – request for approval – Reg.

Ref: 1. No.F.22-1/2007(AC) Dt.3 Apr 2007

2. OU. Lr. NoMR.69/H/2007/Acad, Dt:12-06-07.

3. GO. Rt. No.467 HE. (CE-1) Dept. Dt.29.6.2007.

4. MGU Lr. No. 347/MGU/Staff.App./2017-18. Dt.17-08-2017

With reference to the subject cited, I am submitting the list of Board of studies for
academic years 2017-18 for your approval.

SNO	CATEGORY	NAME & DESIGNATION	CONTACT NOS
1	Chairman Board of studies	Sri.P.Yedukondalu.	9849056316
2	University Nominee	Dr.A.BhanuPrasad, Principal.GDC, Ramanapet,	9848385850 <i>HP</i>
3	Subject expert from outside the college	Smt.K.Manjula Asst. Prof. of chemistry GDC(w),Nalgonda.	8143462182 <i>✓</i>
4	Subject expert from outside the college	Dr. A. Srinivasulu, Asst. Prof. of chemistry, KRR GDC, Kodad.	9440140506 <i>George</i>
5	Members: All The Faculty members of the Dept.	1. Sri. P. Ravi Kumar 2. Dr. K.Venakata Krishana 3. Sri. K. Ravi 4. Dr. B. Bixamaiah 5. Sri. K. Ravi kumar 6. Smt.V. Bhavani 7. Sri. M. Ramu 8. Sri. B. Thirumalesha	9440208972 9441993436 9160616309 9440522563 <i>HP</i> 9052999960 8019758494 9912670252 9505562658
6	One representative from Industry/Corporate sector/Allied areas		

Submitted by

Proposals approved




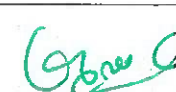

HP
In-Charge / Chairman BOS

HP
Principal / Chairman academic council
Nagarjuna Govt. College
(Autonomous) NALGONDA.

NAGARJUNA GOVT. COLLEGE, NALGONDA (ATONOMOUS)

DEPARTMENT OF CHEMISTRY

CONSTITUTED BOARD OF STUDIES: 2017-2018

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		5. Sri. K. Ravi kumar	9052999960
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Submitted by



In-Charge / Chairman BOS

Proposals approved



Principal / Chairman academic council
Principal
Nagarjuna Govt. College
(Autonomous) NALGONDA.

NAGARJUNA GOVT.DEGREE COLLEGE ,NALGONDA

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc I YEAR I SEMESTER, SYLLABUS

PAPER - 1

Unit-I (Inorganic Chemistry)

15h(1 hr/week)

S1-I-1. s-block elements:

General Characteristics of groups I and II elements, Diagonal relationship between Li and Mg, Be and Al 2 h

S1-I-2. p-block elements 1:

7 h

Group-13: Synthesis and structure of diborane and higher Boranes (B_4H_{10} and B_5H_9), Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3

Group - 14: Carbides-Classification - ionic, covalent, interstitial - synthesis. Structures and reactivity. Industrial application. Silicones - Preparation - a) direct silicon process b) use of Grignard reagent c) aromatic silylation. Classification - straight chain, cyclic and cross-linked.

Group - 15: Nitrides - Classification - ionic, covalent and interstitial. Reactivity - hydrolysis. Preparation and reactions of hydrazine, hydroxyl amine, phosphazenes.

S1-I-3. General Principles of Inorganic qualitative analysis

6 h

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO_3^{2-} , Cl^- , Br^- , SO_4^{2-} , PO_4^{3-} , BO_3^{3-} , CH_3COO^- , NO_3^- .

Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg_2^{2+} , Ag^+ , Pb^{2+}) with flow chart and chemical equations. Principle involved in separation of group II & IV cations.

General discussion for the separation and identification of group II (Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Sb^{2+}), III (Al^{3+} , Fe^{3+}), IV (Mn^{2+} , Zn^{2+}) individual cations with flow chart and chemical equations. Application of concept of hydrolysis in group V cation analysis. General discussion for the separation and identification of group V individual cations

Group 1

1

(Ba²⁺, Sr²⁺, Ca²⁺) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg²⁺, NH₄⁺).

Unit - II (Organic Chemistry)

15h (1 hr/week)

S1-O-1: Structural Theory in Organic Chemistry

6 h

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance - Mesomeric effect, application to (a) acidity of phenol. (b) acidity of carboxylic acids and basicity of anilines. Stability of carbo cations, carbanions and free radicals. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

Types of organic reactions: Addition reactions- electrophilic, nucleophilic and free radical. Substitution reactions – electrophilic, nucleophilic and free radical. Elimination and Rearrangement reactions– Examples.

S1-O-2: Acyclic Hydrocarbons

6 h

Alkanes – Methods of preparation: Corey-House reaction, Wurtz reaction, from Grignard reagent, Kolbe synthesis. Chemical reactivity - inert nature, free radical substitution, Halogenation example- reactivity, selectivity and orientation.

Alkenes - Preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides, Zaitsev's rule. Properties: Addition of Hydrogen – heat of hydrogenation and stability of alkenes. trans-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H₂O, HOX, H₂SO₄ with mechanism and addition of HBr in the presence of peroxide (anti – Markonikov's addition). Oxidation (cis – additions) – hydroxylation by KMnO₄, OsO₄, trans addition- peracids (via epoxidation), hydroboration, ozonolysis – location of double bond. Dienes – Types of dienes, reactions of conjugated dienes – 1,2 and 1,4 addition of HBr to 1,3 – butadiene and Diels – Alder reaction.

Alkynes – Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Acidity of terminal alkynes (formation of metal acetylides) preparation of higher alkynes, Chemical reactivity – electrophilic addition of X₂, HX, H₂O (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation)

S1-O-3: Alicyclic Hydrocarbons

3 h

Nomenclature, preparation by Freund's method, Dickmann, heating dicarboxylic metal salts. Properties – reactivity of cyclopropane and cyclobutane by comparing with alkanes. Stability of cycloalkanes – Baeyer strain theory, Sachse and Mohr predictions and Pitzer strain theory. Conformational structures of cyclopentane, cyclohexane.

Unit-III (Physical Chemistry)

15 h (1 hr/week)

S1-P-1: Atomic structure and elementary quantum mechanics

6 h

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton effect, De Broglie's hypothesis. Heisenberg's uncertainty principle, Schrodinger's wave equation and its importance. Physical interpretation of the wave function, significance of ψ and ψ^2 , a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, radial and angular functions (only equation), hydrogen like wave functions, quantum numbers and their importance.

S1-P-2: Gaseous State

5 h

Deviation of real gases from ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO₂. The van der Waals equation and critical state. Derivation of relationship between critical constants and van der Waals constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquefaction of gases: i) Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

S1-P-3: Liquid State

4 h

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only). Liquid crystals, the mesomorphic state: Classification of liquid crystals into Smectic and Nematic, differences between liquid crystal and solid / liquid. Application of liquid crystals as LCD devices.

Unit – IV (General Chemistry)

15 h (1 hr/week)

S1-G-1 Chemical Bonding

11 h

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions, covalent nature of ionic bond, covalent bond - Common hybridization and shapes of molecules.

Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of overlapping. Concept of σ and π bonds. Criteria for orbital overlap. LCAO concept. Types of molecular orbitals- bonding, antibonding and non bonding. MOED of homonuclear diatomics - H₂, N₂, O₂, O₂⁻, O₂²⁻, F₂ (unhybridized diagrams only) and heteronuclear diatomics CO, CN, NO, NO⁺ and HF. Bond order, stability and magnetic properties.

S1-G-2 Evaluation of analytical data

4 h

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors, propagation of errors in mathematical operations – addition, subtraction, division and multiplication (with respect to determinate errors).

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem.
4. Vogel's Qualitative Inorganic Analysis by Svehla
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
7. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
8. Qualitative analysis by Welcher and Hahn.
9. Textbook of Inorganic Chemistry by R Gopalan
10. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

Unit- II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by Bruce Yuranis Powla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by Sachin Kumar Ghosh.
6. Text book of organic chemistry by C N pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri and Sharma.
4. Text Book of Physical Chemistry by K. L. Kapoor.
5. Physical Chemistry through problems by S.K. Dogra.
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone.

Unit IV

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.

3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem
4. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar

Laboratory Course

45h (3 h / week)

Paper I Qualitative Analysis - I

I. Preparations:

1. Tetrammine copper (II) sulphate,
2. Potash alum $KAl(SO_4)_2 \cdot 12H_2O$,
3. Bis (dimethylglyoximato) nickel(II)

II. Analysis of two anions (one simple and one interfering)

K. Manjasa, M.Sc BLS
Assistant Professor
Department of Chemistry
Govt. Degree College for Women
NALGONDA

Group

A. Manjasa

29

Faculty of Science

B.Sc. I Yr. I Semester (Backlog) Examination, Mar/Apr 2017

CHEMISTRY - I (NEW-CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5x 2 = 10)**Answer the following questions.**

1. Write the lewis acid nature of BX_3 .
2. What is the mesomeric effect?
3. Write the Wurtz reaction.
4. Give the Planck's radiation law.
5. Define the significant figures.

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Explain the solubility product.
7. Write a short note on Diels - Alder reaction.
8. Explain the Hydroboration with suitable examples.
9. Give the classification of liquid crystals.
10. Explain the Heisenberg uncertainty principle.
11. Draw the molecular orbital energy diagram of 'HF' molecule.

Answer the following questions.**SECTION - C (4 x 10 = 40)**

12. (a) Write the preparation and reactions of hydroxylamine.
(b) How to identify the Ca^{+2} , NH_4^+ ions in qualitative analysis.
(OR)
(c) Write a short note on diborane structure.
(d) Write a short note on Diagonal relationship.
13. (a) Explain the Zaitsev's rule with an example.
(b) What is the Hyper conjugation? Give its application.
(OR)
(c) Write a short note on sache and mohr thoery.
(d) Give the reactions of acetylene.
14. (a) Explain the deBrogleis Hypothesis.
(b) Write the Joule - Thomson effect.
(OR)
(c) Write a short note on viscosity of liquid.
(d) Give the law of corresponding states.
15. (a) Give the classification of Errors.
(b) Draw the molecular orbital energy diagram of ' O_2 ' molecule.
(OR)
(c) Explain the types of molecular orbitals.
(d) Give the Bond order, magnetic nature of ' N_2 ' - molecule.

Gowd

A. S. S. S.

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NAGARJUNA GOVT.DEGREE COLLEGE ,NALGONDA

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc I YEAR II SEMESTER, SYLLABUS

PAPER - 2

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S2-I-1 p-block Elements -II

7 h

Oxides: Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed (c) sub oxide d) peroxide e) superoxide. Structure of oxides of C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

Oxy acids: Structure and acidic nature of oxyacids of B, C, N, P, S and Cl. Redox properties of oxyacids of Nitrogen: HNO_2 (reaction with FeSO_4 , KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), HNO_3 (reaction with H_2S , Cu), HNO_4 (reaction with KBr, Aniline), $\text{H}_2\text{N}_2\text{O}_2$ (reaction with KMnO_4). Redox properties of oxyacids of Potassium: H_3PO_2 (reaction with HgCl_2), H_3PO_3 (reaction with AgNO_3 , CuSO_4).

Redox properties of oxyacids of Sulphur: H_2SO_3 (reaction with KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), H_2SO_4 (reaction with Zn, Fe, Cu), $\text{H}_2\text{S}_2\text{O}_3$ (reaction with Cu, Au), H_2SO_5 (reaction with KI, FeSO_4), $\text{H}_2\text{S}_2\text{O}_8$ (reaction with FeSO_4 , KI)

Interhalogens - classification- general preparation- structures of AB , AB_3 , AB_5 and AB_7 type and reactivity. Poly halides - definition and structure of ICl_2^- , ICl_4^- and I_3^- . Comparison of Pseudohalogens with halogens.

S2-I-2 Chemistry of Zero group elements

2 h

General preparation, structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-halides. Clathrate compounds and Anomalous behavior of He (II)

S2-I-3 Chemistry of d-block elements

6 h

Characteristics of d-block elements with special reference to electronic configuration variable valence, ability to form complexes, magnetic properties & catalytic properties. Stability of various oxidation states and SRP Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad – electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.

Unit - II (Organic chemistry)

15 h (1 hr/week)

S2-O-1: Aromatic Hydrocarbons

7 h

Concept of aromaticity – definition, Huckel's rule – application to Benzenoids and Non – Benzenoids (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).

Preparations: From acetylene, phenols, benzene carboxylic acids and sulphonic acids

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation, and halogenation, Friedel Craft's alkylation (polyalkylation) and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation - (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - carboxy, nitro, nitrile, carbonyl and sulphonic acid & halo groups.

S2-O-2: Arenes and Polynuclear Aromatic Hydrocarbons 3 h

Preparation of alkyl benzenes by Friedel Craft's alkylation, Friedel Craft's acylation followed by reduction, Wurtz-Fittig reaction. Chemical reactivity: Ring substitution reactions, side chain substitution reactions and oxidation.

Polynuclear hydrocarbons - Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Reactivity towards electrophilic substitution. Nitration and sulphonation as examples.

S2-O-3: Halogen compounds 5 hrs

Nomenclature and classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX, Nucleophilic substitution reactions - classification into S_N^1 and S_N^2 . Mechanism and energy profile diagrams of S_N^1 and S_N^2 reactions. Stereochemistry of S_N^2 (Walden Inversion) 2-bromobutane, S_N^1 (Racemisation) 1-bromo-1-phenylpropane explanation of both by taking the example of optically active alkyl halide. Structure and reactivity - Ease hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

Unit - III (Physical Chemistry) 15 h (1 hr/week)

S2-P-1: Solutions 5 h

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes HCl-H₂O and C₂H₅OH - H₂O systems. Fractional distillation, Partially miscible liquids- Phenol - Water, Trimethyl amine - Water and Nicotine - Water systems. Lower upper consolute temperatures. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law with solvent extraction.

S2-P-2: Dilute Solutions & Colligative Properties 5 h

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, Van't hof factor, degree of dissociation and association of solutes.

S2-P-3: Solid state Chemistry 5 h

Laws of Crystallography - (i) Law of Constancy of interfacial angles (ii) Law of Symmetry, Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-

6/20/0
7

A. M. Sreeni

ray diffraction by crystals; Derivation of Bragg's equation, Determination of structure of NaCl, KCl & CsCl (Bragg's method and Powder method).

Unit – IV (General Chemistry)

15 h (1 hr/week)

S2-G-1: Theory of Quantitative Analysis

5 hours

Volumetric Analysis: Introduction, standard solutions, indicators, end point, titration curves, Types of titrations: i) neutralization titration- principle, theory of acid base indicators, titration curves and selection of indicators- strong acid - strong base, strong acid –weak base, weak acid- strong base and weak acid –weak base.

Gravimetric analysis- Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination of Ni²⁺

S3-G-2: Theories of bonding in metals:

5 h

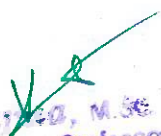
Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

S2-G-3: Material Science

5 h

Classification of materials- classification as metals, ceramics, organic polymers, composites, biological materials etc. The property of super conductivity of materials.

Super conducting materials- elements, alloys and compounds. Properties of super conductors- zero resistivity, Meisener effect and thermal properties. Composites- meaning of composites, advanced composites, classification –particle reinforced fiber reinforced and structural composites general characters of composite materials-Particle-reinforced composites – large particle and dispersion- strengthened composite. Fiber reinforced composites (continuous and discontinuous fiber composites).


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References

Unit I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn
4. Wiley Publishers 2001. Chem
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
7. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
8. Textbook of inorganic chemistry by R Gopalan

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1. Text book of organic chemistry by Morrison and Boyd.
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2. Text Book of Physical Chemistry by Soni and Dharmahara.
3. Text Book of Physical Chemistry by Puri and Sharma
4. Text Book of Physical Chemistry by K. L. Kapoor
5. Physical Chemistry through problems by S.K. Dogra.
6. Elements of Physical Chemistry by Lewis and Glasstone.
7. Material science by Kakani & Kakani

Unit IV

1. Vogel's Text Book of Quantitative Analysis by G.H.Jeffery, J.Bassett, J.Mendham and R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. Quantitative Analysis by Day and Underwood Prentice Hall (India) VI Edn..
3. Nano: The Essentials by T. Pradeep, McGraw-Hill Education.
4. Chemistry of nanomaterials: Synthesis, Properties and applications by CNR Rao et.al.

Gopalan

Sharma

5. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa, Academic Press
6. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

Laboratory Course

45hrs (3 h / week)

Paper II - Qualitative Analysis - II

I Semi micro analysis of mixtures

Analysis of two anions and two cations in the given mixture.

Anions: CO_3^{2-} , SO_3^{2-} , S^{2-} , Cl^- , Br^- , I^- , CH_3COO^- , NO_3^- , PO_4^{3-} , BO_3^{3-} , SO_4^{2-}

Cations: Ag^+ , Pb^{2+} , Hg^+ , Hg^{2+}
 Pb^{2+} , Bi^{3+} , Cd^{2+} , Cu^{2+} , $\text{As}^{3+/5+}$, $\text{Sb}^{3+/5+}$, $\text{Sn}^{2+/4+}$
 Al^{3+} , Cr^{3+} , Fe^{3+}
 Zn^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+}
 Ca^{2+} , Sr^{2+} , Ba^{2+}
 Mg^{2+} , NH_4^+

Gyan

Adarsh

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Faculty of Science

B.Sc. I Yr. II Semester End Examination, Mar/Apr 2017

CHEMISTRY - II (NEW CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5x 2 = 10)**Answer the following questions.**

1. What are clathrate compounds?
2. Write about the Wurtz - Fitting reaction.
3. Explain the Raoult's law.
4. What is co-precipitation.
5. Write the structure of phosphorous oxyacids?

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Explain the reactivity of copper triad.
7. Write the preparation and structure of Inter Halogen of AB_3 type.
8. Write about reactions towards electrophilic substitution in anthracene.
9. Explain the relative lowering of vapour pressure.
10. Write about the Valence Bond Theory (VBT).
11. Explain the Huckel's Rule.

Answer the following questions.**SECTION - C (4 x 10 = 40)**

12. (a) Write about types of oxides.
(b) Explain the magnetic properties of d-block elements.
(OR)
(c) Write about XeF_4 .
(d) Explain the reactivity of nitrogen oxides.
13. (a) Discuss about Friedel-Craft's alkylation.
(b) Explain about S_N1 - mechanism.
(OR)
(c) Compare the ease hydrolysis of various halides.
(d) Explain the ring deactivating groups with examples.
14. (a) Derive Bragg's equation.
(b) Discuss the elevation of boiling point.
(OR)
(c) Write about the symmetry elements in crystals.
(d) Explain the system of phenol and water.
15. (a) Discuss about conductors and semi conductors.
(b) Write about the theory of acid base indicators.
(OR)
(c) What is super conductivity? Explain their properties.
(d) Write a note on composites.

Gore

A. S. S. S.

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NAGARJUNA GOVT.DEGREE COLLEGE ,NALGONDA

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc II YEAR III SEMESTER, SYLLABUS

PAPER - 3

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S3-I-1: Chemistry of f-block elements:

6 h

Chemistry of Lanthanides: Position in periodic table, Electronic structure, oxidation state, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanides-complexation- type of donor ligands preferred. Magnetic properties- paramagnetism. Colour and spectra, f-f transitions –occurrence and separation – ion exchange method, solvent extraction.

Chemistry of actinides- general features – electronic configuration, oxidation state, actinide contraction, colour and complex formation. Comparison with lanthanides.

S3-I-2: Symmetry of molecules

5 h

Symmetry operations and symmetry elements in molecules. Definition of Axis of symmetry types of C_n , Plane of symmetry (σ_h , σ_v , σ_d) Center of symmetry and improper rotational axis of symmetry (S_n). Explanation with examples.

S3-I-3: Non – aqueous solvents

4 h

Classification and characteristics of a solvent. Reactions in liquid ammonia – physical properties, auto-ionisation, examples of ammono acids and ammono bases. Reactions in liquid ammonia – precipitation, neutralization, solvolysis, solvation - solutions of metals in ammonia, complex formation, redox reactions. Reactions in HF – autoionisation, reactions in HF – precipitation, acid – base reactions, protonation.

Unit - II (Organic chemistry)

15 h (1 hr/week)

S3-O-1: Alcohols

6 hrs

Preparation: 1°, 2° and 3° alcohols using Grignard reagent, Ester hydrolysis, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/ZnCl₂ (Lucas reagent), esterification, oxidation with PCC, alk. KMnO₄, acidic dichromates, conc. HNO₃ and Oppenauer oxidation.

Diols: Pinacol - pinacolone rearrangement

Phenols: Preparation: (i) from diazonium salts of anilines, (ii) from benzene sulphonic acids and (iii) Cumene hydroperoxide method.

Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution nitration, halogenation and sulphonation, Reimer Tiemann reaction,

Gattermann-Koch reaction, Azo-coupling reaction, Schotten-Boumann reaction, Houben-Hoesch condensation, FeCl_3 reaction.

S3-O-2: Ethers and epoxides

2 hrs

Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H_2SO_4 . Physical properties – Absence of Hydrogen bonding, insoluble in water, low boiling point. Chemical properties – inert nature, action of conc. H_2SO_4 and HI.

S3-O-3 Carbonyl compounds

7 h

Nomenclature of aliphatic and aromatic carbonyl compounds and isomerism. Preparation of aldehydes & ketones from acid chloride, 1,3-dithianes, nitriles and from carboxylic acids. Special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides Physical properties – absence of Hydrogen bonding. Keto-enol tautomerism, polarisability of carbonyl groups, reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity: Addition of [a] NaHSO_3 (b) HCN (c) RMgX (d) NH_3 (e) RNH_2 (f) NH_2OH (g) PhNHNH_2 (h) 2,4DNP (Schiff bases). Addition of H_2O to form hydrate (unstable), comparison with chloral hydrate (stable), addition of alcohols - hemiacetal and acetal formation. Base catalysed reactions with mechanism- Aldol, Cannizzaro reaction, Perkin reaction, Benzoin condensation, haloform reaction, Knoevenagel condensation. Oxidation reactions – KMnO_4 oxidation and auto oxidation, reduction – catalytic hydrogenation, Clemmenson's reduction, Wolf-kishner reduction, Meerwein Ponnoff Verly reduction, reduction with LAH, NaBH_4 . Analysis – 2,4 -DNP test, Tollen's test, Fehlings test, Schiff's test, haloform test (with equations).

UNIT – III (Physical Chemistry)

15 hr (1h / week)

S3-P-1: Phase Rule

6 h

Statement and meaning of the terms – Phase, Component and degrees of freedom, Gibb's Phase rule, phase equilibria of one component system – water system. Phase equilibria of two-component system – Solid-Liquid equilibria, simple eutectic – Pb-Ag system, desilverisation of lead. Solid solutions – compound with congruent melting point – Mg-Zn system and incongruent melting point – NaCl- H_2O system.

S3-P-2: Colloids & surface chemistry

9 h

Definition of colloids. Classification of colloids. Solids in liquids (sols): preparations and properties – (including Kinetic, Optical and Electrical stability of colloids) Protective action. Hardy-Schultz law, Gold number. Liquids in liquids (emulsions): Types of emulsions, preparation and emulsifier. Liquids in solids (gels); Classification, preparations and properties, General applications of colloids.

Micelles: Classification of surface active agents. Surfactant action, micellization and micellar interactions, Structure of micelles – spherical and lamellar. Critical micellar concentration (CMC). Factors affecting the CMC of surfactants. Counter ion binding to micelles.

Adsorption: Types of adsorption, Factors influencing adsorption. Freundlich adsorption isotherm. Langmuir theory of unilayer adsorption isotherm. Applications.

Unit –IV (General Chemistry)

15 h (1h/week)

S3-G-1: Nanomaterials:

3h

Nano structured materials – Definition, size, description of graphene, fullerenes, carbon nano tubes. Synthetic techniques, bottom-up-sol-gel method, top-down, electro deposition method. Production of carbon nano tubes – arc discharge, laser vaporization methods. General applications of nano materials.

S3-G-2: Stereochemistry of carbon compounds

10 h

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: enantiomers and diastereomers – definitions and examples.

Optical activity: Definition, wave nature of light, plane polarised light, optical rotation and specific rotation, chiral centers. Chiral molecules: definition and criteria - absence of plane, center and S_n axis of symmetry – asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and dissymmetric molecules (trans-1,2-dichlorocyclopropane). Molecules with constitutionally symmetrical chiral carbons (Tartaric acid) Molecules with constitutionally unsymmetrical chiral carbons (2,3-dibromopentane) Number of enantiomers and mesomers - calculation. D, L & R, S configuration for asymmetric and dissymmetric molecules (Allenes, spiro compounds and biphenyls), Cahn-Ingold-Prelog rules. Racemic mixture, Racemisation and Resolution techniques. Geometrical isomerism with reference to alkenes and cyclo alkanes– cis, trans and E, Z configuration.

S3-G-3: Conformational analysis

2 h

Classification of stereoisomers based on energy. Definition and examples of conformational and configurational isomers. Conformational analysis of ethane, n-butane, 1,2-dichloroethane, 2-chloroethanol and methylcyclohexane

References:**Unit- I**

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001.
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6. Material science by Kakani & Kakani

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Laboratory Course

Paper III - Quantitative Analysis - I

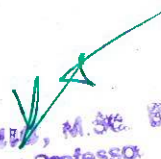
45hrs (3 h / week)

Acid - Base titrations

1. Estimation of Carbonate in Washing Soda.
2. Estimation of Bicarbonate in Baking Soda.
3. Estimation of Carbonate and Bicarbonate in the Mixture.
4. Estimation of Alkali content in Antacid using HCl.

Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$
2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.
3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard


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Faculty of Science
Semester End Examination
Chemistry Model Question Paper (New CBCS)
(with effect from 2016-17)

Time:2:30

Max. Marks: 70

II Year Paper - IV

Part-A

- I. Answer the following questions in one or two sentences 5X2=10
- 1.
 - 2.
 - 3.
 - 4.
 - 5.

Part-B

- II. Answer any four questions from the following not exceeding 20 lines. 4X5=20
- 6.
 - 7.
 - 8.
 - 9.
 - 10.
 - 11.

Part-C

- III. Answer the following questions not exceeding 40 lines 4X10=40
12. A)
B) Or
C)
D)
13. A)
B) Or
C)
D)
14. A)
B) Or
C)
D)
15. A)
B) Or
C)
D)

NAGARJUNA GOVT.DEGREE COLLEGE ,NALGONDA

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc II YEAR IV SEMESTER, SYLLABUS

PAPER - 4

Unit-I (Inorganic Chemistry)

15h (1 h/week)

S4-I-1: Coordination Compounds-I

7 h

Simple inorganic molecules and coordination complexes. Nomenclature – IUPAC rules, 1. Brief review of Werner's theory, Sidgwick's electronic interpretation and EAN rule and their limitations. (Valence bond theory (VBT) – postulates and application to (a) tetrahedral complexes $[\text{Ni}(\text{NH}_3)_4]^{2+}$, $[\text{NiCl}_4]^{2-}$ and $[\text{Ni}(\text{CO})_4]$ (b) square planar complexes $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{PtCl}_4]^{2-}$ (c) octahedral complexes $[\text{Fe}(\text{CN})_6]^{4-}$, $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{FeF}_6]^{4-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{CoF}_6]^{3-}$. Limitations of VBT). 2. Coordination number, coordination geometries of metal ions, types of ligands. 3. Isomerism in coordination compounds, stereo isomerism – (a) geometrical isomerism in (i) square planar metal complexes of the type $[\text{MA}_2\text{B}_2]$, $[\text{MA}_2\text{BC}]$, $[\text{M}(\text{AB})_2]$, $[\text{MABCD}]$. (ii) Octahedral metal complexes of the type $[\text{MA}_4\text{B}_2]$, $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{MA}_3\text{B}_3]$ using suitable examples, (b) Optical isomerism in (i). tetrahedral complexes $[\text{MABCD}]$, (ii). Octahedral complexes $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{M}(\text{AA})_3]$ using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

S4-I-2: Organometallic Chemistry

4 h

Definition, nomenclature and classification of organometallic compounds. Methods of preparation, properties and applications of alkyl and aryl compounds of Li, Mg & Al. Preparation and properties of ferrocene.

S4-I-3: Metal carbonyls and related compounds

4 h

18 valence electron rule, classification of metal carbonyls: $\text{Ni}(\text{CO})_4$, $\text{Fe}(\text{CO})_5$, $\text{Fe}_2(\text{CO})_9$, $\text{Fe}_3(\text{CO})_{12}$ and $\text{Cr}(\text{CO})_6$, Preparation and properties of $\text{Ni}(\text{CO})_4$.

UNIT - II (Organic chemistry)

15 h (1 hr/week)

S4-O-1: Carboxylic acids and derivatives

6 h

Nomenclature, classification and methods of preparation a) Hydrolysis of Nitriles, amides and esters. b) Carbonation of Grignard reagents. Special methods of preparation of Aromatic Acids. Oxidation of the side chain of Arenes. Hydrolysis of benzotrichlorides. Kolbe reaction. Physical properties- hydrogen bonding, dimeric association, acidity – strength of acids with the examples of trimethyl acetic acid and trichloro acetic acid, Relative differences in the acidity of Aromatic, aliphatic acids & phenols. Chemical properties – Reactions involving H, OH and COOH groups -salt formation, anhydride formation, Acid halide formation, Esterification (mechanism) & Amide formation. Reduction of acid to the corresponding primary alcohol - via ester or acid chloride. Degradation of carboxylic acids by Huns Diecker reaction, Schmidt reaction

(Decarboxylation). Arndt – Eistert synthesis, Halogenation by Hell – Volhard - Zelensky reaction. Carboxylic acid Derivatives – Reactions of acid halides, Acid anhydrides, acid amides and esters (mechanism of ester hydrolysis by base and acid).

S4-O-2: Synthesis based on Carbanions

3 h

Acidity of α -Hydrogens of withdrawing groups, structure of carbanion. Preparation of Aceto acetic ester (ethylacetoester) by Claisen condensation and synthetic application of Aceto acetic ester. (a) Acid hydrolysis and ketonic hydrolysis: Butanone, 3-Methyl 2-butanone. Preparation of (i) monocarboxylic acids ii) dicarboxylic acids (b) malonic ester – synthetic applications. Preparation of (i) substituted mono carboxylic acids and (ii) substituted dicarboxylic acids.

S4-O-3 Nitro hydrocarbons:

6 h

Nomenclature and classification of nitro hydrocarbons. Structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity - halogenation, reaction with HNO_2 (Nitrous acid), Nef reaction, Mannich reaction, Michael addition and reduction. Aromatic Nitro hydrocarbons: Nomenclature, Preparation of Nitrobenzene by Nitration. Physical properties, chemical reactivity – orientation of electrophilic substitution on nitrobenzene. Reduction reaction of Nitrobenzenes in different media.

Unit – III (Physical Chemistry)

15 hr (1h / week)

S4-P-1: Electrochemistry & EMF

15 h

Electrical transport – conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kohlrausch's law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf's method for attackable electrodes. Applications of conductivity measurements: Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Electrolyte and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurement. Computation of EMF. Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, cell EMF and single electrode potential, standard Hydrogen electrode – reference electrodes (calamel electrode) – standard electrode potential, sign conventions, electrochemical series and its significance.

Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K). Determination of pH using hydrogen electrode, glass electrode and quinhydrone electrode, Solubility product of AgCl . Potentiometric titrations.

Unit –IV (General Chemistry)

15 h (1h/week)

S4-G-1: Pericyclic Reactions

5 h

Concerted reactions, Molecular orbitals of ethene, 1,3-butadiene and allyl radical. Symmetry properties, HOMO, LUMO, Thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – one example each and their explanation by FMO theory.

S4-G-2: Synthetic Strategies

5 h

Terminology – Target molecule (TM), Disconnection approach – Retrosynthesis, Synthons, Synthetic equivalent (SE), Functional group interconversion (FGI), Linear, Convergent synthesis. Retrosynthetic analysis of the following molecules: 1) acetophenone 2) cyclohexene and 3) phenylethylbromide.

S4-G-3: Asymmetric synthesis

5 h

Definition and classification of stereoselective reactions: substrate, product stereoselective reactions, enantio and diastereo selective reactions. Stereospecific reaction – definition – example – dehalogenation of 1,2-dibromides induced by iodide ion. Enantioselective reactions – definition – example – Reduction of Ethylacetoacetate by Yeast. Diastereoselective reaction-definition-example: Acid catalysed dehydration of 1-phenylpropanal and Grignard addition to 2-phenyl propanal. Definition and explanation of enantiomeric excess and diastereomeric excess.

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001.
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
7. Textbook of Inorganic Chemistry by R Gopalan

Unit- II

1. Text book of organic chemistry by Soni.

2. General Organic chemistry by Sachin Kumar Ghosh.
3. Text book of organic chemistry by Morrison and Boyd.
4. Text book of organic chemistry by Graham Solomons.
5. Text book of organic chemistry by Bruce Yuranis Powla.
6. Text book of organic chemistry by C N pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri and Sharma.
4. Text Book of Physical Chemistry by K. L. Kapoor.
5. Physical Chemistry through problems by S.K. Dogra.
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone.
8. Industrial Electrochemistry, D. Pletcher, Chapman & Hall

Unit IV

1. Text book of organic chemistry by Morrison and Boyd
2. Text book of organic chemistry by Graham solomons
3. Fundamentals of organic synthesis and retrosynthetic analysis
4. by Ratna Kumar Kar
5. Organic synthesis by Dr. Jagadamba Singh and Dr. L.D.S. Yadav
6. Stereochemistry of organic compounds by D. Nasipuri
7. Organic chemistry by Clayden, Greeves, Warren and Wothers
8. Fundamentals of Asymmetric Synthesis by G. L. David Krupadanam

Laboratory Course

Paper IV - Quantitative Analysis - II

45hrs. (3h/ week))

1. Conductometry titrations:
 - i) Strong acid Vs Strong base;
 - ii) Weak acid Vs Strong base.
2. Potentiometry titration:
 - i) Strong acid Vs Strong base;
 - ii) Weak acid Vs Strong base.
3. Estimation of Nickel by back titration (Standard $MgSO_4$ solution will be given)
4. Estimation of Barium as Barium Sulphate

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A. S. S.

Faculty of Science
Semester End Examination
Chemistry Model Question Paper (New CBCS)
(with effect from 2016-17)

Time:2:30

Max. Marks: 70

II Year Paper - III

Part-A

I. Answer the following questions in one or two sentences 5X2=10

- 1.
- 2.
- 3.
- 4.
- 5.

Part-B

II. Answer any four questions from the following not exceeding 20 lines. 4X5=20

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part-C

III. Answer the following questions not exceeding 40 lines 4X10=40

12. A)
B)

Or

- C)
D)

13. A)
B)

Or

- C)
D)

14. A)
B)

Or

- C)
D)

15. A)
B)

Or

- C)
D)

**NAGARJUNA GOVERNMENT DEGREE COLLEGE :: NALGONDA
(ATONOMOUS)**

DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR, V - SEMESTER – CHEMISTRY SYLLABUS

PAPER -5

Organic Chemistry

UNIT – I

1. Nitrogen compounds

9hrs

Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1^o, 2^o, 3^o Amines and Quarternary ammonium compounds. Preparative methods -1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 4. Reduction of Amides and Schmidt reaction. Physical properties and basic character – Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline – comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties:

a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1^o, 2^o, 3^o (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. oxidation of aryl and 3^o Amines. Diazotization Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation

UNIT - II

1. Heterocyclic Compounds

5hrs

Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring system – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions.

Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4,- dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one

method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

2. Carbohydrates

6 hrs

Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagents and oxidation to gluconic and saccharic acid).

Number of optically active

8hrs

isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose.

Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-nhexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula). Interconversion of Monosaccharides: Aldopentose to aldo hexose – eg: Arabinose to D-Glucose, D-Mannose (Kiliani - Fischer method). Epimers, Epimerisation – Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose to Darabinose by Ruff degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose) and Ketohexose (fructose) to aldohexose (Glucose)

UNIT - III

1. Aminoacids and proteins

5hrs

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids – definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Optical activity of naturally occurring amino acids: L-configuration, irrespective of sign rotation, Zwitterion structure – salt like character - solubility, melting points, amphoteric character, definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups – lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

2. Mass Spectrometry:

5hrs

Basic principles – Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions. Representation of mass spectrum. Identification of parent ion, (M^{+1}), (M^{+2}), base peaks (relative abundance 100%) Determination of molecular formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine and 1- propanal.

UNIT - IV

1. Reactivity of metal complexes:

4hrs

1. Labile and inert complexes, ligand substitution reactions – SN^1 and SN^2 , substitution reactions of square planar complexes – Trans effect and applications of trans effect.

2. Stability of metal complexes:

4hrs

Thermodynamic stability and kinetic stability, factors

affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

2. HARD AND SOFT ACIDS , BASES (HSAB);

4hrs

Classification, Pearson's concept of hardness and softness, application of HSAB principles- stability of compounds/complexes, predicting the feasibility of reaction

4. Bio inorganic chemistry:

4hrs


Essential elements, biological significance of Na, K, Mg, Ca,

Fe, Co, Ni, Cu, Zn and chloride (Cl⁻). Metalloporphyrins – hemoglobin, structure and Function, Chlorophyll, structure and role in photosynthesis.

5. Spectral and magnetic properties of metal complexes:

4hrs

Electronic absorption spectrum of $[Ti(H_2O)_6]^{3+}$ ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility – Gouy method.


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Faculty of Science
B.Sc. III Yr. V Semester (Backlog) Examination, Mar/Apr 2017
CHEMISTRY - V (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

Answer the following questions.

1. Write a note on carbylamine reaction.
2. Why pyrrole is feebly acidic character? Explain.
3. Define molecular ion, fragment ion.
4. Write the Haworth formula of fructose.
5. Write any two differences between labile and inert complexes.

SECTION - B (4 x 5 = 20)

Answer any FOUR of the following questions.

6. Write the oxidation reactions of glucose and fructose and explain.
7. Write oxidation, reduction properties of isocyanides.
8. Write the structures of pyrrole, furan, thiophene and pyridine.
9. Write any five physical properties of amino acids.
10. What are metalloporphyrins? Explain role of Haemoglobin in oxygen transportation process.
11. Write a note on mole ratio method for the determination of complex composition.

SECTION - C (4 x 10 = 40)

Answer the following questions.

12. (a) Write the secondary structure of proteins.
(b) Compare the basic strength of ammonia, methylamine, dimethyl amine, trimethyl amine and aniline.
(OR)
(c) How furan, pyrrole and thiophene are prepared from Paul - Knorr synthesis?
(d) Compare aromaticity of pyridine with pyrrole.
13. (a) Write the strecker's synthesis for the preparation of Alanine.
(b) What is zwitter ion? Write its effect on solubility and melting points?
(OR)
(c) Write the structure elucidation of open chain structure of fructose.
(d) Write the inter conversion of arabinose to glucose.
14. (a) Write the mass spectrum of acetophenone?
(b) Explain the theory of separation of ions in mass spectral analysis.
(OR)
(c) Write the factors affecting stability of metal complexes.
(d) Write the mechanism of ligand substitution reactions of square planar complexes.
15. (a) Define trans effect. Give any two applications of trans effect.
(b) Classify acids and bases according to Pearson's concept.
(OR)
(c) Explain the structure and functions of chlorophyll.
(d) What is the biological significance of Co, Ni, Cu, Zn and chloride?

**NAGARJUNA GOVERNMENT DEGREE COLLEGE :: NALGONDA
(ATONOMOUS)**

DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR, V - SEMESTER – CHEMISTRY SYLLABUS

PAPER – 6

Physical Chemistry

UNIT – I

1. Chemical kinetics

9hrs

Rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the rate of reaction. Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Kinetics of complex reactions (first order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Theories of reaction rates- collision theory-derivation of rate constant for bimolecular reaction. The transition state theory (elementary treatment).

UNIT – II

1. Photochemistry

5hrs

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Ferrioxalate actinometry. Photochemical hydrogen- chlorine, hydrogen-bromine reaction. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions- energy transfer processes (simple example)

2. Thermodynamics –I

6hrs

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule's law-Joule-Thomson coefficient. Calculation of w , q , dU and dH for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation-Kirchoff's equation.

UNIT - III

Thermodynamics –II

10hrs

Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature. Concept of entropy, entropy as a state function, entropy changes in cyclic, reversible, and irreversible processes and reversible phase change. Calculation of entropy changes with changes in V & T and P & T . Entropy of mixing inert perfect gases. Entropy changes in spontaneous and equilibrium processes. The Gibbs (G) and Hlmholtz (A) energies. A & G as criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change. Gibbs equations and the Maxwell relations. Variation of G with P , V and T .

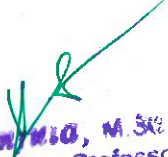
UNIT - IV

Inorganic chemistry

1. Coordination Chemistry:

10hrs

IUPAC nomenclature, bonding theories – review of Werner's theory and Sidgwick's concept of coordination, Valence bond theory, geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal field theory, splitting of d- orbitals in octahedral, tetrahedral and square-planar complexes – low spin and high spin complexes factors affecting crystal field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds – structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.


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Faculty of Sciences
B.Sc. III Yr. V Semester (Backlog & Imp) Examination, May 2017
CHEMISTRY-VI (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)**Answer the following questions.**

1. Define heat capacity and state function.
2. Write the units for zero order and third order rate constants.
3. Define Grothus-Draper law.
4. Define second law of thermodynamics.
5. Write the formula of the following compounds.
 - (i) Triamino-trinitrito-o-cobalt (III)
 - (ii) Sodium, tetrachloroszincate (II)

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. A reaction system absorbs radiation at 2860 Å. Calculate quantum yield of 10 moles of reactant, adsorbed 500 k.cal energy.
7. Write different statements of First law of thermodynamics.
8. Half life of a first order reaction is 100 sec. How much time is required to complete 99% of reaction?
9. Prove that $\mu_{JT} = 0$ for ideal gases.
10. Calculate EAN of $[Fe(CN)_6]^{4-}$ ion.
11. Explain optical isomerism of co-ordination compounds with examples.

SECTION - C (4 x 10 = 40)**Answer the following questions.**

12. (a) Write a note on opposing and parallel reactions.
(b) For a given reaction, rate is $2.4 \times 10^{-5} \text{ min}^{-1}$ at 283K and $1.6 \times 10^{-4} \text{ min}^{-1}$ at 313K respectively. Calculate activation energy of this reaction.
(OR)
(c) Derive an equation for first order rate constant.
(d) Derive the equation for the second order rate constant for $A+B \rightarrow$ products.
13. (a) Calculate entropy changes with changes in V & T.
(b) 5 moles of an ideal gas expanded reversibly and isothermally from 5L to 50L at 300K, find the work done.
(OR)
(c) Explain Joule's law and derive Joule-Thomson co-efficient.
(d) Define and explain Kirchoff's law.

..2nd page..

14. (a) Write the conditions for spontaneous nature of thermodynamic equilibrium.
(b) Explain Jablonski diagram.

(OR)

- (c) Differentiate thermal and photo chemical reactions.
(d) Calculate magnetic susceptibility using Guoy's method.

15. (a) Discuss the splitting of d-orbitals in tetrahedral complexes.
(b) What is CFSE? Calculate CFSE of d^5 configuration in low spin and high spin complexes.

(OR)

- (c) Explain the salient features of VBT.
(d) Explain different types of stereo isomerism in coordination number 6 compounds.

//TELUGU VERSION//
CHEMISTRY - VI (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

1. ఉష్ణధారణత్వం మరియు స్థితిప్రమేయం లను నిర్వచించుము.
2. సూన్య మరియు తృతీయ క్రమాంక చర్మల రేటు స్థిరాంకములకు ప్రమాణాలు వ్రాయండి.
3. గ్రాఫ్-డ్రేపర్ నియమమును నిర్వచించుము.
4. ఉష్ణగతికశాస్త్ర రెండవ నియమంను నిర్వచించుము.
5. ఈ క్రింది సమ్మేళనాల పేర్లను అనుసరించి నిర్మాణాన్ని వ్రాయండి.

(i) ట్రి ఎమీన్ డైనైట్రోబేంజో-0-కోబాల్ట్ (III)

(ii) సోడియం టాట్రాక్లోరో జింకేట్ (II)

SECTION - B (4 x 5 = 20)

ఈ క్రింది ప్రశ్నలకు ఏవేని నాలుగు ప్రశ్నలకు మాత్రమే జవాబులు వ్రాయండి.

6. ఒక చర్మావ్యవస్థ 2860 \AA తరంగదైర్ఘ్యం గల కాంతిని శోషించుకొనును. 500 k.cal ల శక్తిని గ్రహించి 10 మోల్ల క్రియాజనకాలతో చర్మ జరిపినపుడు క్వాంటం దక్షత ఎంత?
7. ఉష్ణగతికశాస్త్ర మొదటి నియమ భిన్న నిర్వచనాలను వ్రాయండి.
8. ప్రథమక్రమాంక చర్మ యొక్క అర్థాయువు 100 సె. 99% పూర్తికావడానికి ఎంతకాలం పట్టును?
9. ఆదర్శవాయువులలో $\mu_{JT} = 0$ అని నిరూపించండి.
10. $[\text{Fe}(\text{CN})_6]^{4-}$ అయాన్ యొక్క EAN ను లెక్కించుము.
11. ఉదాహరణలతో సమన్వయ సమ్మేళనాల ధృవణ సాధ్యతాన్ని వివరించండి.


Contd....3

..3rd page..

ఈ క్రింది ప్రశ్నలకు జవాబులు వ్రాయండి.

SECTION - C (4 x 10 = 40)

12. (a) వ్యతిరేక మలయు సమాంతర చర్యలపైఁస ఒక వ్యాఖ్య వ్రాయండి.
 (b) ఒక రసాయన చర్య యొక్క చర్యారేటు $2.4 \times 10^{-5} \text{ min}^{-1}$ 283K వద్ద మలయు $1.6 \times 10^{-4} \text{ min}^{-1}$ 313K వద్ద వరుసగా వున్నాయి. అయితే ఈ చర్య యొక్క ఉత్తేజితశక్తిని లెక్కించండి.
 (OR)
 (c) ప్రథమక్రమాంక చర్యారేటు స్థిరాంక సమీకరణమును ఉత్పాదించుము.
 (d) $A + B \rightarrow$ క్రియాజన్యాలు అను ద్వితియక్రమాంక చర్య యొక్క రేటుస్థిరాంక సమీకరణాన్ని ఉత్పాదించండి.
13. (a) V మలయు T లో మార్పును అనుసరించి ఎంట్రోపిలో మార్పుని లెక్కించండి.
 (b) 5 మోల్ ల ఆదర్శవాయువు 300 k. వద్ద సమోష్ణ ఉత్తమణీయంగా 5 లీ. నుండి 50 లీ.కు వ్యాకోచిస్తే జరుగుపనిని కనుక్కోండి.
 (OR)
 (c) జౌల్ నియమాన్ని వివరించి, జౌల్-థాంప్సన్ గుణకాన్ని ఉత్పాదించండి.
 (d) కిర్కాఫ్ నియమాన్ని నిర్వచించి వివరింపుము.
14. (a) ఉష్ణగతికశాస్త్ర సమతాస్థితి ఆయత్నీకృత స్వభావానికి వుండవలసిన షరతులు వ్రాయండి.
 (b) జబ్లోంస్కీ పటమును వివరించుము.
 (OR)
 (c) ఉష్ణీయ మలయు కాంతిరసాయన చర్యలను భేదపరుచుము.
 (d) గాయ పద్ధతిని ఉపయోగించి అయస్కాంత ఆవశ్యకతను లెక్కగట్టండి.
15. (a) చతుర్ముఖీయ సమ్మేళనాలలో అల్టిటాక్ట విభజనను చర్చించండి.
 (b) CFSE అనగానేమి? అల్ట్రావైయట్ మలయు అధిక భ్రమణ సంశ్లిష్టాలలో d^5 విన్యాసపు CFSE ని లెక్కించండి.
 (OR)
 (c) VBT యొక్క ముఖ్య ప్రతిపాదనలు వివరించండి.
 (d) సమన్వయ సంఖ్య 6 వున్న సమ్మేళనాల భిన్నరకాల ప్రాదేశిక సాదృశ్యాన్ని వివరించండి.


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**NAGARJUNA GOVERNMENT DEGREE COLLEGE :: NALGONDA
(ATONOMOUS)**

DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR, VI - SEMESTER – CHEMISTRY SYLLABUS

PAPER – 7

Physico Chemical methods of analysis

UNIT - I

1. Separation techniques

1. Solvent extraction: Principle and process, Batch extraction, continuous extraction and counter current extraction. Application – Determination of Iron (III). 2. Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, R_f values, factors effecting R_f values.

a. Paper Chromatography: Principles, R_f values, experimental procedures, choice of paper and solvent systems, developments of chromatogram – ascending, descending and radial. Two dimensional chromatography, applications.

b. Thin layer Chromatography (TLC): Advantages. Principles, factors effecting R_f values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

c. Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications

d. High Performance Liquid Chromatography (HPLC): Principles and Applications. e. Gas Liquid Chromatography (GLC): Principles and Applications

UNIT - II

2. Spectrophotometry

4hrs

General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of 1. Chromium in K₂Cr₂O₇
2. Manganese in manganous sulphate, 3. Iron (III) with thio cyanate.

2. Electronic spectroscopy:

4hrs

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals. Energy levels of molecules (σ, δ, n). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.

UNIT - III

1. Infra red spectroscopy

4hrs

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. An harmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

2. Raman spectroscopy

3hrs

Concept of polarizability, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

3. Proton magnetic resonance spectroscopy (¹H-NMR)

5hrs

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants.

Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

4) Spectral interpretation

3hrs

Interpretation of IR, UV-Visible, ¹H-NMR and mass spectral data of the following compounds

1. Phenyl acetylene, 2. Acetophenone, 3. Cinnamic Acid, 4. para-nitro aniline.

UNIT - IV

1. Pesticides

5hrs

1. Introduction to pesticides – types – Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheromones and Hormones. Brief discussion with examples, Structure and uses.

ii. Synthesis and present status of the following.

DDT, BHC, Malathion, Parathion, Endrin, Baygon, 2,4-D and Endo-sulphon

2. Green Chemistry

5hrs

Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry

Green synthesis: Evaluation of the type of the reaction. i) Rearrangements (100% atom economic),

ii) Addition reaction (100% atom economic), Pericyclic reactions (no by-product). Selection of

solvent: i) Aqueous phase reactions, ii) Reactions in ionic liquids, iii) Solid supported synthesis,

iv) Solvent free reactions (solid phase reactions).

ii) Green catalysts: i) Phase transfer catalysts (PTC), ii) Biocatalysts

Microwave and Ultrasound assisted green synthesis:

1. Aldol condensation


2. Cannizzaro reaction

3. Diels-Alder reactions

4. Strecker synthesis

5. Willaimson synthesis

6. Dieckmann condensation


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Faculty of Sciences
B.Sc. III Yr. VI Semester-End Examination, Mar/Apr 2017
CHEMISTRY-VII (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)**Answer the following questions.**

1. What is Differential migration in chromatography?
2. Define the transmittance.
3. What is finger print region Absorption limit?
4. What is chemical shift?
5. What are pheromones?

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Explain solvent extraction of Batch method.
7. What are the Advantages of thin layer chromatography?
8. Write the types of Electronic transitions.
9. Write spectral interpretation proton NMR of Ethyl Bromide.
10. Explain concept of polarizability.
11. What is green chemistry? Write basic principles of green chemistry.

SECTION - C (4 x 10 = 40)**Answer the following questions.**

12. (a) What is paper chromatography? Write the types of paper chromatography.
(b) What is solvent extraction? Explain principle and process of continuous solvent extraction.

(OR)

- (c) Write the following.
 - i) Two Dimension chromatography
 - ii) HPLC (High Performance Liquid chromatography)
- (d) Write separation techniques through column chromatography.

13. (a) Explain the single and double beam spectro meter with the help of diagram.
(b) Define the Beer Lambert law and Write quantitative Analysis of Iron (III) thiocyanate.

(OR)

- (c) Write the types of molecular spectra with Interaction of electro magnetic radiations and write potential energy curves.
- (d) Write the following (i) Chromophore (ii) Batho chrome.

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**NAGARJUNA GOVERNMENT DEGREE COLLEGE :: NALGONDA
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DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR, VI - SEMESTER – CHEMISTRY SYLLABUS

PAPER – 8

Drugs, Macromolecules, Material Science & Catalysis

UNIT - I

Drugs, formulations

1. Drugs

1. Introduction: Drug, disease (definition), Historical evolution, Sources – Plant, Animal synthetic, Biotechnology and human gene therapy
2. Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors – brief treatment). Metabolites and Anti metabolites.
3. Nomenclature: Chemical name, Generic name and trade names with examples
4. Classification: Classification based on structures and therapeutic activity with one example each.
5. Synthesis: Synthesis and therapeutic activity of the following drugs., L-Dopa, Chloroquin, Omeprazole, Albuterol and ciprofloxacin.

DRUG DEVELOPMENT-HIV -AIDS AND FROMULATIONS

1. Drug Development:- Penicillin, Separation and isolation, structures of different penicillin's

2. HIV-AIDS:-Immunity – CD-4 cells, CD-8 cells Retrovirus, replication in human body.

Investigation available, prevention of AIDS. Drugs available – examples with structures:

PIS: Indinavir (Crixivan), Nelfinavir (Viracept), NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir (Ziagen), Lamivudine (Epivir, 3TC) Zidovudine (Retravir, AZT, ZDV) Monographs of drugs: Eg. Paracetamol, Sulpha methoxazole (Tablets).

3. Formulations

Need of conversion of drugs into medicine. Additives and their role (brief account only). Different types of formulations

UNIT - II

Macromolecules, and Super Conductivity

1. Macromolecules

Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization – tacticity. Molecular weight of polymers number average and weight average molecular weight, degree of polymerization, determination of molecular weight of polymers by viscometry, Osmometry and light scattering methods. Kinetics of free radical polymerization, derivation of rate law. Preparation and industrial application of polyethylene, PVC, Teflon, polyacrylonitrile, terelene and Nylon66. Introduction to biodegradability.

2. Super Conductivity

Superconductivity, characteristics of superconductors, Meissner effect, types of superconductors and applications.

UNIT - III


1. Catalysis

Homogeneous and heterogeneous catalysis, comparison with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar. Kinetics of specific base catalyzed reactions, base catalyzed conversion of acetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis of esters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms of heterogeneous catalysis. Langmuir-Hinshelwood mechanism.

Enzyme catalysis: Classification, characteristics of enzyme catalysis. Kinetics of enzyme catalyzed reactions-Michaelis Menton law, significance of Michaelis constant (K_m) and maximum velocity (V_{max}). Factors affecting enzyme catalysis- effect of temperature, pH, concentration and inhibitor. Catalytic efficiency. Mechanism of oxidation of ethanol by alcohol dehydrogenase.

Nanomaterials- synthetic techniques, bottom-up-sol-gel method, top-down- electro ,deposition method. Properties and applications of nano-materials

Composites-definition, general characteristics, particle reinforce and fiber reinforce composites and their applications.


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Faculty of Sciences
B.Sc. III Yr. VI Semester-End Examination, Apr 2017
CHEMISTRY-VIII (CBCS)

Time: 2 ½ Hrs.

Max.Marks: 70

SECTION - A (5 x 2 = 10)**Answer the following questions.**

1. What is a drug?
2. What is facticity?
3. Define Meissner effect
4. Define Michaelis Mentons law
5. What are composites?

SECTION - B (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Explain the terms of metaboltes and Antimetabolites.
7. What is therapeutic activity of L-Dopa and write its synthesis.
8. How to prevent - AIDS and write structur of Indinavir and Nelfinavir.
9. Write the preparation of polyacryl nitrile and write their application.
10. What are the factors effecting enzyme coatalysis.
11. Write general characters of composites.

SECTION - C (4 x 10 = 40)**Answer the following questions.**

12. (a) Explain the source of Drugs in plants.
(b) Define the following terms.
i) Pharmacopore ii) Pharmaco dynamics
(OR)
(c) Write the classification of Drugs based on the therapectic activites.
(d) Write synthesis and therpeutic activites of chloroquine .
13. (a) What is Immunity? Role of CD₄ cells on Immunity of Human body.
(b) How drug is converted in medicine? What is the role additive in medicins?
(OR)
(c) Write the following.
i) Chain polymerisation ii) Coordination polymersisaty
(d) Write monographs of paracetamol.

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Ashwini

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