HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad

B.Sc. II YEAR SEMESTER III & IV

DEPARTMENT OF CHEMISTRY

(2021-2022)

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD

(AUTONOMOUS)

COMPOSITION OF THE BOARD OF STUDIES IN AN AUTONOMOUS COLLEGE

I. Composition: Department of Chemistry

1. Head of the Department concerned (Chairman)

Smt. T. Haritha, Department of Chemistry

2. The entire faculty of each specialization

1. Smt. T. Haritha

2. Ms. Fouziya Unnisa

3. Ms. Anisha Dimple

3. One expert to be nominated by the Vice Chancellor from a panel of six recommended by the College Principal

1. Chairperson, BOS, Dept. of Chemistry, Osmania University,Hyderabad.

4. Two experts on the subject from outside the college to be nominated by the AcademicCouncil.

1. Dr. P.Leelavathi, Head ,Department of Chemistry, Osmania University, Hyderabad.

2. Dr. P. Saritha Reddy, Head,Department of Chemistry, Osmania University, Hyderabad.

3. Dr. Kiranmai, Head of the Chemistry Department, Andhra Mahila Sabha Arts &Science College, Hyderabad.

5. One postgraduate meritorious alumnus to be nominated by the Principal. The Chairman,Board of Studies, may with the approval of the Principal of the College.

1. Shri Vipin Kumar, M.Sc. Chemistry.

2. Shri Vikesh Kumar loan providing officer in SBI Head Office of Mumbai.

(a) Experts from outside the College whenever special courses of studies are to be formulated. - To be nominated.(b) Other members of staff of the same faculty.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

AGENDA OF THE MEETING

4.1 Welcome address by the chair.

4.2 Previous Meeting Details.

4.3 Details of choice based credit system.

4.4 Discussion and Distribution of Common Core Syllabus for the Semesters (IIIand IV)

4.5 Marks allotted for internal and end semester exams.

4.6 Discussion on Pattern and model paper of Semester Exam and internal exam for all theSemester (III and IV)

4.7 Discussion on Practical exam model paper for the Semesters (III and IV)

4.8 Panel of Examiners

4.9 Any other matter

4.10 Vote of thanks

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES
Academic Year – 2021-2022
Minutes of BOS Meeting

BOS meeting of the Department of Chemistry was held on ....12-11-2021....

The following members were present

Prof. U.Umesh Kumar - University Nominee

Smt. T. Haritha - Chair person

Dr. P.Leelavathi - Member of BOS

Dr. P.Saritha Reddy - Member of BOS

Dr. K.Kiranmai- Member of BOS

Department of Chemistry
Osmania University
HYDERABAD-500 007

Professor
Department of Chemistry
Osmania University
HYDERABAD - 500 007

Asso. Professor
Department of Chemistry
Osmania University
HYDERABAD - 500 007

4.1 Welcome address by the chair

The chair welcomed the University Nominee, Chairperson BOS, O.U. Department of Chemistry and Member of B.O.S.

4.2 Previous Meeting details

The CBCS system has been introduced by Osmania University from 2016-17. The theory and practical syllabus of I & II Semesters of B.Sc., new syllabus , question paper pattern for theory and practical, internal assessment pattern, practical examination scheme and panel of examiners were discussed and approved by all the BOS Members in previous BOS meeting.

4.3 Details of choice based credit system.

Members were informed that TSCHE has referred that from the academic year 2016-17 autonomous institutions have to follow CBCS i.e. From the Academic Year 2016-17 Osmania University has instructed all the Degree colleges including Autonomous Degree colleges to follow CBCS under which after passing the exam student will get the Grade in the Final Result. B.Sc. III YEAR in V and VI semester 3 credits are given for theory paper and 1 credit is given for practical in each semester.

4.4 Discussion and Distribution of Common Core Syllabus for semester I and II.

i. Members were informed by the chair that Department of chemistry, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University B.Sc. II YEAR in III and IV semesters.

ii. The syllabus comprises of 4 units.

iii. Syllabus copy for both the semesters is enclosed.

iv. Syllabus was approved by the Members of BOS.

4.5 Marks allotted for Internal and end Semester exams.

1. Internal assessment is of 30 marks and this is online test, where students have to answer 20 MCQs in 25 minutes. Each question carries 1 mark. In each Semester two internal assessments of 20 Marks will be conducted and an average of both the internal assessments will be added in the marks of theory exam.

2. Theory Question paper is of 70 marks.

3. Total allotted marks are 100 for each theory paper DSC/DSE (A&B).

The distribution of marks was approved by the Members of BOS.

4.6 Discussion on Pattern and Model Paper of Semester exam and Model Paper of Internal Exam

1. It was informed by the department that in each Semester Two Internal exams will be conducted for 20 marks. The internal assessment will have three sections.

Section – A 20 Multiple choice questions each carries 1marks (20 X 1 =20M),

Section – B Assignment – 5 Marks

Section – C Seminar – 5 Marks

Average marks of these two internal exams will be taken.

2. Semester exam will be conducted as per the Almanac which will be provided by the exam branch. Internal exam duration will be 25 Min and Semester exam duration will be of 2 1/2hrs.

3. Model Question paper for Semester III and Semester IV was discussed. Theory paper for each Semester will have 2 sections.

i) Section A contains 8 short Questions. The student has to answer six questions. Each Question carries 3 Marks (6X3=18 Marks)

ii) Section B contains 4 Essay type Questions with internal choice. Each Question carries 13 Marks (4X13=52 Marks)

- Pattern of Model Theory Question Papers for DSC and SEC Paper I and Paper II are enclosed.

Pattern of Model Theory Question Papers for DSC and SEC was approved by Member of BOS

4.7 Discussion on Practical Exam Model paper.

It was decided in BOS meeting that 25 Marks Practical Exam of 3 hrs will be held in each Semester and 1 credit will be given for Practical in each Semester.

- It is decided that the practical examinations held for B.Sc second years (Semester III & IV) from the academic year 2021-22 onwards will have the pattern of 25 marks scheme and the credits will remain the same i.e. 1 credit. The duration of the exam will be 3 hours.
- Pattern of Model Practical Question Papers for Paper III and Paper IV are enclosed.
- Pattern of Model Practical Question Papers was approved by Members of BOS

4.8 Panel of Examiners

The panel of examiners was approved by the members.

List is enclosed

4.9 Any other matter.

4.10 Vote of Thanks

Meeting concluded with the Vote of Thanks by Smt. T. Haritha.

Chairperson

University Nominee

Head
Department of Chemistry
Osmania University
HYDERABAD-500 007

Members

1. Professor
Department of Chemistry
Osmania University
HYDERABAD-500 007
Board of Studies in Chemistry
Dept. of CABA Chemistry
Osmania University, Hyd-07

2. Asso. Professor
Department of Chemistry
Osmania University
HYDERABAD - 500 007

3.

Principal

PRINCIPAL
HINDI MAHA VIDYAL
(AUTONOMOUS)
Arts, Commerce & Sci
Nallakunta, Hyderaba

HINDI MAHAVIDYALAYA

(AUTONOMOUS)

Affiliated to Osmania University, Nallakunta, Hyderabad-44

CBCS STRUCTURE FOR 2021-2022 BATCH

B.Sc. – Biotechnology /Biochemistry, Microbiology, Mathematics, Physics, Chemistry

ACADEMIC YEAR 2021-2022

SECOND YEAR SEMESTER - III					Semester End Exam		Continuous Internal Evaluation		Total	Practical 3 hours
Code	Course Title	Course Type	HPW	Credits	Duration in Hours	Marks	Exam Duration	Marks		
BS301	SEC - 1	SEC-1	2	2	1 ½	35	20 min.	15	50	
BS302	SEC- 2	SEC-2	2	2	1 ½	35	20min	15	50	
BS303	English-III	CC-1C	4	4	2 ½	70	30 min.	30	100	
BS304	Second Language-III	CC-2C	4	4	2 ½	70	30 min.	30	100	
BS305	Biotechnology/Biochemistry / Maths-III	DSC-1C	4T+3P=7	4+1=5	2 ½	70	30 min	30	100	25
BS306	Microbiology / Physics - III	DSC-2C	4T+3P=7	4+1=5	2 ½	70	30 min	30	100	25
BS307	**Chemistry-III**	**DSC-3C**	**4T+3P=7**	**4+1=5**	**2 ½**	**70**	**30 min**	**30**	**100**	**25**
			33	**27**		**420**		**180**	**600**	**75**

Chairperson

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CBCS STRUCTURE FOR 2021-2022 BATCH

B.Sc. – Biotechnology /Biochemistry, Microbiology, Mathematics, Physics, Chemistry

ACADEMIC YEAR 2021- 2022

SECOND YEAR SEMESTER - IV					Semester End Exam		Continuous Internal Evaluation		Total	Practical 3 hours
Code	Course Title	Course Type	HPW	Credits	Duration in Hours	Marks	Exam Duration	Marks		
BS401	SEC - 3	SEC-3	2	2	1 ½	35	20 min.	15	50	
BS402	SEC- 4	SEC-4	2	2	1 ½	35	20min	15	50	
BS403	English-IV	CC-1D	4	4	2 ½	70	30 min.	30	100	
BS404	Second Language-IV	CC-2D	4	4	2 ½	70	30 min.	30	100	
BS405	Biotechnology/Biochemistry / Maths-IV	DSC-1D	4T+3P=7	4+1=5	2 ½	70	30 min	30	100	25
BS406	Microbiology / Physics - IV	DSC-2D	4T+3P=7	4+1=5	2 ½	70	30 min	30	100	25
BS407	**Chemistry-IV**	**DSC-3D**	**4T+3P=7**	**4+1=5**	**2 ½**	**70**	**30 min**	**30**	**100**	**25**
			33	**27**		**420**		**180**	**600**	75

Chairperson

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HYDERABAD-500 007

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NALLAKUNTA, HYDERABAD

Chemistry Paper III

Code: BS306	DSC-3C
Instruction	
Theory classes	4 hrs /week
Practical classes	2 hrs/week
Credit for theory	4
Credit for practical	1
Duration of semester examination	2 ½ hrs
Duration of internal examination	30 mins
Semester examination marks	70 marks
Internal marks	30 marks

Unit-I: (Inorganic Chemistry)

S3-I-1:Chemistry of f-block elements: 15hr(1hr/week)

Chemistry of Lanthanides : Position in periodic table,Electronic Structure,Oxidation State,Ionic and atomic radii- Lanthanide contraction-cause and consequences, anomalous behaviour of post lanthanides-complexation-type of donor ligands preferred. Magnetic properties-para magnetism. 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.Comparision with lanthanides.

S3-I-2 : Coordination Compounds-I

Simple inorganic molecules and coordination complexes. Nomenclature -IUPAC rules. 1. Coordination number, coordination geometries of metal ions, types of ligands. 2. Werner's theory, Sidgwick's electronic interpretation and EAN rule and their limitations. Valence bond theory (VBT)-postulates and applications to (a) tetrahedral complexes $[Ni(NH_3)_4]^{2+}$, $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ (b) Square planar complexes $[Ni(CN)_4]^{2-}$, $[Cu(NH_3)_4]^{2+}$, $[PtCl_4]^{2-}$ (c) Octahedral complexes $[Fe(CN)_6]^{4+}$, $[Fe(CN)_6]^{3-}$, $[FeF_6]^{4-}$, $[Co(NH_3)_6]^{3+}$,$[CoF_6]^{3-}$. Limitations of VBT. 3. Isomerism in coordination compounds, stereo isomerism- (a) geometrical isomerism in (i) square planar metal complexes of the type $[MA_2B_2]$,$[MA_2BC]$,$[M(AB)_2]$, [MABCD]. (ii) Octahedral metal complexes of the type $[MA_4B_2]$, [M(AA)2B2] ,$[MA_3B_3]$ using suitable examples.

(b) Optical isomerism in (i) Tetrahedral complexes [MABCD], (ii) Octahedral complexes $[M(AA)_2B_2]$, $[M(AA)_3]$ using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

S3-I-3: Metal carbonyls and Organometallic Chemistry

Metal carbonyls: Preparation and properties of $Ni(CO)_4$. Structural features of $Ni(CO)_4$, $Fe(CO)_5$, $Fe_2(CO)_9$, $Fe_3(CO)_{12}$ and $Cr(CO)_6$.. 18 -valence electron rule.

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

Unit-II: (Organic Chemistry) **15 h(1Hr/ week)**

S3-O-1: Carboxylic acids and derivatives

Preparation: a) Hydrolysis of Nitriles, amides and esters. B) Carbonation of Grignard reagents, Special methods of preparation of Aromatic Acids-Oxidation of Arenes. Physical properties-H-bonding, dimeric association. 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 , Halogination by Hell-Volhard -Zelensky reaction. Carboxylic acid Derivatives-Hydrolysis and Ammonolysis of acid halides, Acid anhydrides and esters (mechanism of ester hydrolysis by base and acid). Hydrolysis and dehydration of amides.

S3-O-2: Nitrohydrocarbons

Preparation of Nitroalkanes. Reactivity- halogenation , reaction with HNO_2(Nitrous acid), Nef reaction , reduction. Aromatic Nitrohydrocarbons: Preparation of Nitrobenzene by Nitration. Physical properties, chemical reactivity-Reduction of Nitrobenzenes in different media.

S3-O-3:Amines, Cyanides and Isocyanides

Amines: classification into 1^0, 2^0, 3^0 Amines and Quaternary ammonium compounds. Preparative methods- Ammonolysis of alkylof alkyl halides, Gabriel synthesis, Hoffmann's Bromamide reaction(mechanism). Reduction of Amides and Schmidt reaction. Physical properties. Use of amine salts as phase transfer catalysts. Chemical properties : a) Alkylation b) Acylation c) Carbyl amine reaction d) Hinsberg separation. Rection with Nitrous acid of 1^0, 2^0, 3^0 (Aliphatic and Aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration , Oxidation of Aryl and 3^0 Amines. Diazotisation. Diazonium salts : Preparation with mechanism. Synthetic importance – a) Replacement of diazonium group by-OH, X, (Cl)-Sandmeyer and Gatterman reaction, by Flourine (Schiemann's reaction), by Iodine. CN, NO2, H and Aryl groups. Coupling reactions of diazonium salts i) with Phenols ii) with amines, Reduction to phenyl hydrazines.

Cyanides and Isocyanides: Structure, Preparation of cyanides from a) Alkyl halides b) from amides c) from alodoximes. Preparation of isocyanides from Alkyl halides and Amines.

Properties of cyanides and isocyanides. a) hydrolysis b) addition of Grignard reagent c) reduction d) oxidation.

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

S3-P-1: Thermodynamics -1

A brief review of Energy, work and heat units, mechanical equivalent of heat, definition of system, surroundings. First law of thermodynamics statement- various forms mathematical expression. Thermodynamic quantities extensive properties and intensive properties, state function and path functions. Energy as a state function and exact differential. Work of expansion and heat absorbed as path function.

Expression for work of expansion, sign convention problems on first law. Heat changes at constant pressure and heat changes at constant volume. Enthalpy. Heat capacities at constant pressure and constant volume. Derivation of C_p-C_v= R. Isothermal adiabatic processes. Reversible and irreversible processes. Reversible change and maximum work. Derivation of expression for maximum work for isothermal reversible process. Problems. Internal energy of an ideal gas. Joules experiment. Joule-Thompson coefficient. Adiabatic changes in ideal gas. derivation of equation, PV constant. P-V curves for isothermal and adiabatic processes. Heat of a reaction at constant volume and at constant pressure, relation between ΔH and ΔV, Variation of heat of reaction with temperature. Kirchhoff's equation and problems. Limitations of first law and need for second law. Statement of second law of thermodynamics. Cyclic process. Heat engine, Carnot's theorem, Carnot's cycle. Derivation of efficiency of heat engine. Problems. Thermodynamic scale of temperature.

S3-P-2: Thermodynamics-II **5h**

Entropy: Definition from Carnot's cycle. Entropy as a state function. Entropy as a measure of disorder. Sign of entropy change for spontaneous and non- spontaneous processes &equilibrium processes. Entropy changes in i). Reversible isothermal process, ii). Reversible adiabatic process, iii), Phase change, iv). Reversible change of state of an ideal gas. Problems. Entropy of mixing of ideal gases. Free energy Gibb's function (G) and Helmholtz'sfunction (A) as thermodynamic quantities. Concept of maximum work and network ΔG as Criteria for spontaneity. Derivation of equation ΔG=ΔH-TΔS. Significance of the equation. Gibbs equations and Maxwell relations. Variation of G with P, V and T.

Unit-IV (General Chemistry) **15hrs(1 hr/ week)**

S3-G-1: Theories of bonding in metals **4 hr**

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

S3-G-2: Carbanions-I 5h

Introduction, acidic nature of a-hydrogens and tautomerism in carbonyl compounds, nitro hydrocarbons, ethyl acetoacetate, diethyl malonate. Terminal alkynes. Stabilty of carbanions Reactions: Aldol reaction, Perkin reaction, Benzoin condensation, haloform reaction, conversion of smaller alkynes to higher alkynes.

S3-G-3: Phase Rule 6h

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.

References

General reference: B.Sc II Year Chemistry: Semester III, Telugu Academy publication,

Unit-1

1. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar

2. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications (1996).

3. Concise Inorganic Chemistry by J.D. Lee 3d edn Van Nostrand Reinhold Company(1977)

4. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul L. Gaus 3rd edn Wiley Publishers (2001).

5. Inorganic Chemistry Principles of structure and reactivity by James E.Hubey.E.A. Keiter and R.L. Keiter 4m edn. (2006)

6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).

7. Inorganic Chemistry by Shriver and Atkins 3d edn Oxford Press (1999).

8.Textbook of Inorganic Chemistry by R Gopalan(Universities Press(2012)

9. College Practical chemistry by V K Ahluwalia. Sunitha Dhingra and Adarsh

Gulati Universities Press (India) Limited (2012)

Unit-II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninth edition (2012)

2. General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008).

3. Text book of organic chemistry by Morrison and Boyd. Person(2009)

4. Text book of organic chemistry by Graham Solomons. Wiley(2015)

5. Text book organic chemistry by BruiceYuranisPowla. (2012)

6. Text book of organic chemistry by CN pillai CRC Press (2012)

7. Organic Chemistry by LG. Wade Jr.

8. Organic Chemistry by M. Jones, Jr 9. Organic Chemistry by John McMurry.

Unit III

1. Principles of physical chemistry by Prutton and Marron. The MacmillanCompany; 4 Edn.(1970)

2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand and Sons. (2011).

3. Text Book of Physical Chemistry by Puri and Sharma. S. Nagin chand and Co/2017)

4. Text Book of Physical Chemistry by K. L. Kapoor. (2012)

5. Colloidal and surface chemistry, M. Satake, Y. Hayashi, Y.Mido, S.A.Iqbal and

6. M.S.sethi, Discovery Publishing Pvt.Ltd (2014)

7. Material science by Kakani&Kakani, New Age International (2016) Chemistry by Ira Levine (Author -Hill ducation; 6 edition (May 9, 2008).

8 .physical chemistry by Ira levine (author) McGraw-Hill Education (May9,2008).

Unit IV

1. Text book of organic chemistry by Morrison and Boyd. Person(2009)

2. Text book of organic chemistry by Graham solomons, Wiley(2015)

3. Text book of organic chemistry by Sony, Sultan Chand & Sons; 29th edition (2012)

4. Text book of organic chemistry by BruiceyuranisPowla, (2012)5. General Organic chemistry by Sachinkumar Ghosh, New Age Publishers Pvt Ltd (2008)

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NALLAKUNTA, HYDERABAD
B.Sc-II Year Semester- III
Chemistry Paper- III

Laboratory Course **45 h (3h/week)**

Paper III (Organic Synthesis

1.Synthesis of Organic compounds:

Acetylation: Acetylation of salicylic acid, Benzoylation of Aniline.

Aromatic electrophilic substitution: Nitration: Preparation nitro benzene and m-dinitro - benzene.

Halogenation: Preparation of p-bromo acetanilide, Preparation of 2,4,6-tribromo phenol

Oxidation:Preparation of benzoic acid from benzyl chloride,

Esterification: Preparation of n-butyl acetate from acetic acid.

Methylation: Preparation of -naphthyl methyl ether.

Condensation: Preparation of benzilidine aniline and Benzaldehyde and aniline.

Diazotisation: Azocoupling of B-Naphthol.

2. Microwave assisted synthesis of Aspirin-DEMO (demonstration only)

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc II year Semester – III Paper - III
Theory Model Question Paper

Time: 2 1/2hrs Max.Marks:70

SECTION A

I Write short notes on any Six of the following: 6 X 3 = 18 Marks

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit IV
8. A question from Unit IV

SECTION B

II Answer all the Questions. Each question carries 13 marks 4 X 13 = 52 Marks

9 (a) A question from Unit I
(b) A question from Unit I
(OR)
(c) A question from Unit I
(d) A question from Unit I
10. (a) A question from Unit II
(b) A question from Unit II
(OR)
(c) A question from Unit II
(d) A question from Unit II
11.(a) A question from Unit III
(b) A question from Unit III
(OR)
(c) A question from Unit III
(d) A question from Unit III
12.(a) A question from Unit IV
(b) A question from Unit IV
(OR)
(c) A question from Unit IV
(d) A question from Unit IV

Chairperson / University Nominee

Department of Chemistry
Osmania University
HYDERABAD-500 007

Members
1. Professor
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Osmania University
HYDERABAD - 500 007
2.
3.

Principal
PRINCIPAL
HINDI MAHAVIDYALAYA
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Arts, Commerce & Scienc
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NALLAKUNTA, HYDERABAD

B.Sc Chemistry- II Year

Semester – III Paper - III

Practical Model Question Paper

Max. Marks:25

Time 3 hrs

1.Write the Principle and procedure of the given preparation (5 Marks)

2.write a brief procedure along with chemical equation and prepare a pure sample of the compound given and submit the crude and recrystallized samples.

(15 Marks)

(2 Marks)

3. Record

(3 Marks)

4. Viva

Chairperson University Nominee Members

Professor
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B.Sc. IIYear Semester – IV

Chemistry Paper IV

Code: BS406 DSC – 3D

Instruction	
Theory classes	**4 hrs /week**
Practical classes	**2 hrs/week**
Credit for theory	**4**
Credit for practical	**1**
Duration of semester examination	**2 ½ hrs**
Duration of internal examination	**30 mins**
Semester examination marks	**70 marks**
Internal marks	**30 marks**

Unit-I (Inorganic Chemistry) **15h (1 h/week)**

S4-1-1: Coordination Compounds II **9 h**

Crystal field theory (CFT) Postulates of CFT, splitting patterns of d-orbitals in Octahedral, tetrahedral, square planer with suitable examples. Crystalfield stabilization energies and its calculations for various d^n configurations in octahedral complexes. High Spin, Low Spin complexes. Colour and Magnetic properties of transition metal complexes. Calculations of magneticmoments spin only formula. Detection of complex formation - basic principles of various methods- change in chemical properties, solubility, colour, pH, conductivity, magnetic susceptibility.

Thermodynamic and kinetic stability of transition of metal complexes. Stability ofmetal complexes -stepwise and overall stability constant and their relationship and chelate effect, determination of composition of complex by Job's method and mole ratio method.

Applications of coordination compounds: Applications of coordinationcompounds a) in quantitative and qualitative analysis with suitable examples b) in medicine for removal of toxic metal ions and cancer therapy c) in industry as catalysts polymerization-Ziegler Natta catalyst d) water softening.

S4-1-2: Hard and soft acids bases (HSAB)– **2h**

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

S4-1-3:Bioinorganic Chemistry 4h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl-). Toxic metal ions As, Hg & Pb Oxygen transport and storagestructure of Heamoglobin, binding and transport of oxygen. Fixation of CO_2 in photosynthesis- overview of light and dark reactions in photosynthesis. Structure of chlorophyll and coordination of magnesium. Electron transport in light reactions from water to NADP+ (Z-scheme).

Unit - II (Organic Chemistry) **15hrs(1hr/week)**

$4-0-1: Carbohydrates **6h**

Introduction: Classification and nomenclature. 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. Number of optically active, isomers possible for the structure, configurationof glucose based on D-glyceraldehyde as primary standard (No proof for configuration is required). Evidence for cyclic structure of glucose (Pyranone structure, anomeric Carbon and anomers) Proof for the rang size (methylation, hydrolysis and oxidationreactions). Haworth formula and chair conformational formula Structure of fructose: Evidence of 2-ketoloso structure. Some osazone formation from glucose and fructose, Hydrogen bonding in Osazones, cyclic structure for fructose(Furanose structure.Haworth formula).

Inter Conversion of Monascharides: Arabinose to D-glucose, D- mannose (kiliani-Fischermethod). Epimers Epimerisation Lobry de bruyn van Ekenstein rearrangement. D-glucose toDarubinmehry Ruff's degradation Aldohexose(glucose) to ketchexose (-) (fructose) andKetohexose(Fructose) to aldohexose (Glucose)

S4-0-2: Amino acids and proteins **4h**

Classification, 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) Stecker's synthesis Physical properties: Optical activity of naturally occurring anino acids. Zwitterion structure salt like character, definition of isolectric 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 momenclature of peptides, Primary structure of proteins, d peptide synthesis

S4-0-3: Heterocyclic Compounds **5h**

Introduction and definition 5 membered ring compounds with one hetero alom Es Finan Thiophene and pyrole. Importance of ring systems Numbering. Aromatic characterResonance structures: Explanation of feebly acidic character of pyrrole, electrophilic abstitution. Halogenation, Nitration and Salphomation Reactivity of furan as 1,3-diene, Diebs Alder actions (ome examples Salphonation of thiophene purification of Benzene obtained fam coal tar). Preparation of furan, Pyrrole and thiophene Paul-Knorr synthesis, Structure of pyridine. Basicity

Aromaticity Comparison with pyrole preparation by Hatch method and properties-Reactivity Nocleophilic substitution properties - Reactivity sowardsNacleophilicsabstitution reaction-chichihabin reaction

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

S4-P-1: Chemical Kinetics **11hr**

Introduction to chemical kinetics, rate of reaction, variation of concentration with time, rate laws and raie constant Specific reaction rate Factors influencingreaction rates: effect of concentration of reactants, effect of temperature, effect of pressure, effect of reaction medium, effect of radiation, effect of catalyst with simple examples. Order of a reaction. First order reaction, derivation of equation for rate constant Characteristics of first order reaction. Units for rate constant. Half-life period, graph of first order reaction, Examples Decomposition of H_2O_2, and decomposition of oxalic acid. Problems.

Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problemsSecond order reaction, derivation of expression for second order rate constant, examples, Saponification of ester, $20_3 \rightarrow 30_2$,$C_2H_4 + H_2 \rightarrow C_2H_6$ Characteristics of second order reaction, units for rate constants, half-life period and second order plots. Problems

S4-P-2: Photochemistry **4hr**

Introduction to photochemical reactions, Difference between thermal and photochemical reactions Laws of photo chemistry:Grotthus Draper law, Stark-Einstein's Law of photochemical equivalence, Quantum yield, Examples of photo chemical reaction with different quantum yields. Photo chemical combinations of H-Cland H. Br reactions, reasons for the high and low quantum yield. Problems based on quantam efficiency Consequences of absorption. Singlet and triplet states. Jablonski diagram. Explanation of internal conversion, inter system crossing, phosphorescence, fluorescence.

Unit IV (General Chemistry)15h (1 hr/week)

S3-G-1 Evaluation of analytical data **4hr**

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors. Problems based on mean, median, range, standard deviation

S4-G-2:Carbanions-II **5 hr**

Mannich reaction, Michael addition and Knoevengeal condensation Synthetic application of Acetoacetic str. Acid hydralysis and ketonic hydrolysis: Preparation of t monocarboxylic acids and dicarboxylic acids Malonic ester- synthetic applications Preparation of i) substituted mono carboxylic acids and(ii) substituted dicarboxylic acids

S4-G-3: Colloids & Surface Chemistry **6 hr**

Definition of colloids. Classification of colloids. Solids in liquids (sols) perparations and properties Kinetic, Optical and Electrical stability of colloids Protective action. Handy Schultz

law, Gold number. Liquids in liquids (emulsions), Types of emulsions, preparation and emulsifier. Liquids in solid(gel) Classification, preparations and properties. General applications of colloids

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

References

General reference: B.Sc II Year Chemistry: Semester IV. Telugu Academy publication, Hyd

Unit-1

1. Principles of Inorganic Chemistry by Par, Sharma and Kalia Vishal Publications (1996)
2. Concise Inorganic Chemistry by 1.D. Lee Seedn. Van NostrandReinholdCompany 1977)
3. Basic Inorganic Chemistry by F.A.Cat, G. Wilkinson and Paul L. Causdn Wiley Publishers (2001)
4. Inorganic Chemistry Principles of structure and reactivity by James E.Hubey E.A. Keiter and RL. Keiter 46 ed. (2006)
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
6. Inorganic Chemistry by Shriver and Atkins 3eds OsdordPress (1999)
7. Textbook of Inorganic Chemistry by R Gopalan, Universities Press (2012)

UNIT-II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons Twenty Ninthedition (2012)
2. General Organic chemistry by Sachin Kumar Gbosh, New Age Publishers Pvt Ltd (2008)
3. Text book of organic chemistry by Morrison and Boyd. Personi 2009)
4. Text book of organic chemistry by Graham Solomons. Wiley(2015)
5. Text book of organic chemistry by BruiceYuranisPowla (2012)
6. Taxi book of organic chemistry by CN pillai CRC Press (2012)
7. Organic Chemistry by L. G. Wade ir.
8. Organic Chemistry by M. Jones, Jr
9. Organic Chemistry by John McMurry.

Unit III

1. Principles of physical chemistry by Prutton and Marron. TheMacmillanCompany. 4th ed (1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Salthan Chand &sons (2011)
3. text Book of Physical Chemistry by Puri and Sharma S Nagin hand and Co.(2017)
4. Text Book of Physical Chemistry by K 1. Kapoor. (2012)
5. Physical Chemistry through problems by S.K. Dogra (2015)
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry byLewisGlasstione Macmillan (1960)

8. Industrial Electrochemistry, D. Pletcher, Chapman & Hall, London, 1990

Unit IV

Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publication (1995)

1. 2 Concise Inorganic Chemistry by 1.D. Lee Seeds. Van Nostrand Reinhold Company (1977)
2. Basic Inorganic Chemistry by F.A.Cotton, G. Wilkinson and Paul L. Gaus 3rd edn Wiley Publishers (2001)
3. Joorganic Chemistry Principles of structure and reactivity by James E.Hubey E.A. Kriter and R.L. Kenter da odu. (2006)
4. . Text book of organic chemistry by Morrison and Boyd, Person (2009)
5. Text book of organic chemistry by Graham salomons, Wiley (2015)
6. Fundamentals of organic synthesis and remsynthetic analysis by Ratna Kumar Kar CHA (2014)
7. Organic synthesis by Dr Jagadamba Singh and Dr. L.D.5. Yadav, Pragati Prakashan, 2010
8. 7. Simeochemistry of organic compounds by D. Nasipuri, New Academic Science Limited, 2012 Organic chemistry by Clayden, Greeves, Warren and Wothers, Oxford University Press, 2001 9. Fundamentals of Asymmetric Synthesis by G. L. David Krupadanam, Universities, Press 2014

HINDI MAHAVIDYALAYA
(AUTONOMOUS)

NALLAKUNTA, HYDERABAD

B.Sc Chemistry- II Year

Semester – IV Paper - IV

Laboratory Course

Qualitative Analysis of Organic Compounds: **45hrs (3 h/week)**

Qualitative analysis: Identification of organic compounds through the functional group analysis ignition test, determination of melting points/boiling points, solubility test, functional group trats and preparation of suitable derivatives of the following:

Carboxylic acids, phenols, amines, urea thiourea, carbohydrates, aldehydes, ketones, amides, nitro hydrocarbons, ester and naphthalene

Chairperson **University Nominee** **Members** **Principal**

HOD
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Osmania University
HYDERABAD-500 007

1. Professor
Department of Chemistry
Osmania University
2. Asso. Professor
Department of Chemistry
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc II year Semester – IV Paper - IV
Theory Model Question Paper

Time: 2 1/2hrs Max.Marks:70

SECTION A

I Write short notes on any Six of the following: 6 X 3 = 18 Marks

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit IV
8. A question from Unit IV

SECTION B

II Answer all the Questions. Each question carries 13 marks 4 X 13 = 52 Marks

9 (a) A question from Unit I
(b) A question from Unit I
(OR)
(c) A question from Unit I
(d) A question from Unit I

10. (a) A question from Unit II
(b) A question from Unit II
(OR)
(c) A question from Unit II
(d) A question from Unit II

11.(a) A question from Unit III
(b) A question from Unit III
(OR)
(c) A question from Unit III
(d) A question from Unit III

12.(a) A question from Unit IV
(b) A question from Unit IV
(OR)
(c) A question from Unit IV
(d) A question from Unit IV

Chairperson **University Nominee** **Members** **Principal**

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Department of Chemistry
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2. Professor
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HINDI MAHAVIDYALAYA,
(AUTONOMOUS)

NALLAKUNTA, HYDERABAD

B.Sc Chemistry- II Year

Semester – IV Paper - IV

Practical Model Question Paper

Time 3 hrs

Max. Marks:25

1.write a brief procedure along with chemical equation and prepare a pure sample of the compound given and submit the crude and recrystallized samples.

(20 Marks)

3. Record

(2 Marks)

4. Viva

(3 Marks)

Chairperson

University Nominee

Head
Department of Chemistry
Osmania University
HYDERABAD-500 007.

Members

1. Professor
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2. Asso. Professor
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Principal

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