HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)
(Affiliated to Osmania University)
Nallakunta, Hyderabad-44

B.Sc. II YEAR SEMESTER III

DEPARTMENT OF CHEMISTRY

2017-2018

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. Pooja Kaushal – Department of Chemistry

2. The entire faculty of each specialization.
   1. Smt. Pooja Kaushal

3 One expert to be nominated by the vice-chancellor from a panel if six recommended by the College Principal.

   1. Prof.M. Vithal, Chairman, BOS, Dept. of Chemistry

4. Two experts in the subject from outside the college to be nominated by the Academic Council.
   1. Dr. K. Radha, Head of Chemistry Department St Ann's Degree & P.G College, Hyd.
   2. Dr. Kiranmai Head of the Chemistry Department, Andhra Mahila Sabha Arts & Science College, Hyd.

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.

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Hindi Mahavidyalaya
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University Nominee
Prof.M. Vithal
Chairman – BOS
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Osmania University, Hyderabad.

Members of BOS

1. Dr. K Radha
   Head - Department of Chemistry
   St. Ann's Degree & P.G. college (Autonomous),
   Mehdipatnam Hyderabad.

2. Dr. Kiranmai
   Head – Department of Chemistry
   Andhra Mahila Sabha Arts & Science College(Autonomous),
   OU campus, Hyderabad

Alumni:

3. Sri . Vipin kumar
   M.Sc. organic chemistry

4. Sri Vikesh Kumar
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DEPARTMENT OF CHEMISTRY
AGENDA OF THE MEETING
TUESDAY 18.7.2017

3.1 Welcome address by the chair.

3.2 Previous Meeting Details.

3.3 Details of choice based credit system.

3.4 Discussion and Distribution of Common Core Syllabus for semester III and IV.

3.5 Marks alloted for internal and end semester exams.

3 6 Discussion on Pattern and model paper of Semester Exam and internal exam for semester III and IV

3.7 Discussion on Practical exam model paper.

3.8 Discussion on Practical Question bank.

3.9 Panel of Examiners

3.10 Any other matter

3.11 Vote of Thanks

Priya

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DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES
Academic Year – 2017-18

Minutes of BOS Meeting

BOS meeting of the Department of Chemistry was held on 18.7.2017, Tuesday at 10.00AM

The following members were present

Prof. M. Vithal	-	University Nominee
Smt. Pooja Kaushal	-	Chairperson
Dr. Kiranmai	-	Member
Dr. K. Radha	-	Member

3.1 Welcome address by the chair

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

3.2 Previous Meeting details

The CBCS system has been introduced by Osmania university from 2016-17.The Theory and practical syllabus of I and II semester, 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.

3.3 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. 4 Credits are given for theory paper and 1 credit is given for practical in each semester.

3.4 Discussion and Distribution of Common Core Syllabus for semester III and IV

i. Members were informed by the chair that Department of Chemistry, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University.

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ii. We are following same syllabus prescribed by Osmania University for III and IV Semester as it is without any changes.

Syllabus copy for III and IV semesters is enclosed.

Syllabus was approved by the Member of BOS.

3.5 Marks allotted for Internal and end Semester exams.

1. Internal assessment is of 20 marks. (15M for Internal + 5 M for assignment).In each Semester two internal assessment of 15 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 80 marks.
3. Total allotted marks are 100.

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

3.6 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 15 marks and 5 marks will be allotted for assignment. Average of 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 30Mts and Semester exam duration will be of 3 hrs.
3. Model Question paper for Semester I and Semester II was discussed. Theory paper for each Semester will have 2 sections.
   i) Section A contains 8 short Questions. The student has to answer four questions. each question carries 5 Marks (4X5=20 Marks)
   ii) Section B contains 4 Essay type Questions with internal choice. Each Question carries 15 Marks (4X15=60 Marks)

Pattern of Model Question Papers for Paper III and Paper IV are enclosed.

Pattern of Model Question Paper was approved by Member of BOS.

3.7 Discussion on Practical Exam Model paper.

- It was resolved in BOS meeting that 50 Marks Practical Exam of 3 hrs will be held in III and IV Semester for 2016-17 Batch students and 1 credit will be given for Practical.
- It is decided that the practical examinations held for B.Sc first years (Semester I & II) from the academic year 2017-18 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 2 hours.
- The Practical model paper was approved by the Member of BOS.

8 Discussion on Practical Question bank .

Practical question bank was approved by BOS members for paper I ,II,III and IV.

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St. Ann's College for Women

3.9 Panel of Examiners

The panel of examiners was approved by the members.
List is enclosed

3.10 Any other matter.

3.11 Vote of Thanks

Meeting concluded with the Vote of Thanks by Smt. Pooja Kaushal.

Chairperson

University Nominee

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Members

1.

2.

3.

Principal

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2017-18 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATION

B.SC. BT MB CH /BC MB CH

SECOND YEAR SEMESTER-III					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS301	A/B	SEC-1	2	2	2	40	30 min	10	50	-
BS302	English	CC-1C	5	5	3	80	30 min	20	100	-
BS303	Second Language	CC-2C	5	5	3	80	30 min	20	100	-
BS304	BIO-CHEMISTRY / BIO- TECHNOLOGY	DSC-1C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	50
BS305	MICROBIOLOGY	DSC-2C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	50
BS306	CHEMISTRY	DSC-3C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	50
	TOTAL NO. OF CREDITS			27		440		110	700	

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B.Sc. II Year Semester – III
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	**3 Hrs**
Duration of Internal Examination	**30 Min**
Semester Examination Marks	**80 Marks**
Internal Examination Marks	**20 Marks**

Objective: The course is aimed at exposing the students to some basic knowledge in each branch of chemistry.

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 (σh, σv, σd) 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.

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Unit - II (Organic chemistry) **15 h (1 hr/week)**

S3-O-1: Alcohols **6 hrs**

Preaparation: 1°, 2° and 3° alchols using Griganard reagent, Ester hydrolysis, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, $HX/ZnCl_2$ (Lucas reagent), esterification, oxidation with PCC, alk. $KMnO_4$, acidic dichromates, conc. HNO_3 and Oppenauer oxidation.

Diols: Pinacol - pinacolone rearrangement

Phenols: Preapartion: (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. Riemer Tiemann reaction, Gattermann-Koch reaction, Azo-coupling reaction, Schotton-Boumann raction, 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 hrs**

Nomenclature of aliphatic and aromatic carbonyl compounds and isomerism.

Praparation 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 - hemi acetal and acetal formation. Base catalysed reactions with mechanism- Aldol, Cannizaro reaction, Perkin reaction, Benzoin condensation, haloform reaction, Knoevengeal condensation. Oxidation reactions – $KMnO_4$ oxidation and auto oxidation, reduction – catalytic hydrogenation, Clemmenson's reduction, Wolf- kishner reduction, Meerwein Pondoff Verly reduction, reduction with LAH, $NaBH_4$. Analysis – 2,4 – DNP test, Tollen's test, Fehlings test, Scihff'stest, haloform test (with equations).

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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 Electricalstability of colloids) Protective action. Hardy–Schultz law, Gold number. Liquids in liquids(emulsions): Types of emulsions, preparation and emusifier. 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 laminar. 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.

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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 disymmetric 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 disymmetric 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.

2 h

S3-G-3: Conformational analysis

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

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Referances:

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
8. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

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 Bruice 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. Colloidal and surface chemistry , M. Satake, Y. Hayashi, Y.Mido, S.A.Iqbal and M.S.sethi
6. Material science by Kakani & Kakani

Unit IV

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 Sony
4. Text book of organic chemistry by Bruice yuranis Powla
5. General Organic chemistry by Sachin kumar Ghosh

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B.Sc. II Year Semester – III
CHEMISTRY Practical Paper – III
Quantitative Analysis - I

Code: BS306P	
Instruction	**3 Hrs / Week**
Duration of Exam	**3 Hrs**
Marks for Exam	**50 Marks**
Laboratory Course	**45 Hrs**

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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B.Sc II Year Semester - III
CHEMISTRY

Scheme of Model Question Paper

Time – 3 Hrs | Max. Marks: 100

Semester Exam Pattern | **80 Marks**

Section – A 8 Short Answer Questions ------ Answer any four | 5 X 4 = 20 Marks
Each carries 5 marks

Section—B 4 Long answer questions -----with internal choice | 4 X 15 = 60 Marks
Each carries 15 Marks

Total Marks = 80

Internal Assessment Pattern | **20 Marks** | **Duration - 30 Min**

In Internal Assessment there will be 3 sections

Sections A 10 –Multiple choice questions 10 X ½ =5 Marks

Section –B 10—Fill in the Blanks 10 X ½ =5 Marks

Section –C 5 - Short Answer Questions 5 X 1= 5Marks

15 Marks

Two Internal Assessment Average is to be considered $\frac{15+15}{2}$ = 15 Marks

One Assignment to be given 5 Marks

Internal Assessment Total 20 Marks

Note: Equal Weightage has to be given to all units in each semester

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B.Sc II Year Semester – III
CHEMISTRY
Paper – III
Theory Question Paper Pattern

Time: 3 hrs | Max. Marks: 80

SECTION A

I Write any Four of the following (Short Questions) — 4 X5 = 20 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 Essay Questions. Answer all the Questions — 4 X 15= 60 Marks

9 (a) A Question from Unit I
(OR)
(b) A Question from Unit I

10. (a). A Question from Unit II
(OR)
(b). A Question from Unit II

11 (a) A Question from Unit III
(OR)
(b) A Question from Unit III

12 (a) A Question from Unit IV
(OR)
(b) A Question from Unit IV

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B.Sc. II Year Semester – III
CHEMISTRY
Paper- III
Quantitative Analysis - I
Practical Model Question Paper

Time: 3Hrs **Total Marks: 50**

I Write brief procedure along with principle involved in the following experiment. **6M**

1.Determination of carbonate in the given solution.
2. Determination of bicarbonate in the given solution.
3. Determination of carbonate and bicarbonate in the mixture.
4. Determination of alkali content in antacid using HCl.
5. Determination of Fe(II) using $K_2Cr_2O_7$.
6. Determination of Fe(II) using $KMnO_4$ with oxalic acid as primary standard.
7. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.

II Estimate the amount in the given following experiments. **34M**

1. Determination of carbonate in the given solution.
2. Determination of bicarbonate in the given solution.
3. Determination of carbonate and bicarbonate in the mixture.
4. Determination of alkali content in antacid using HCl.
5. Determination of Fe(II) using $K_2Cr_2O_7$.
6. Determination of Fe(II) using $KMnO_4$ with oxalic acid as primary standard.
7. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.

III Record & Vivavoice **10M**

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CHEMISTRY
Paper- III
Quantitative Analysis - I
Practical Question Bank

1.Determination of carbonate in the given solution.

2. Determination of bicarbonate in the given solution.

3. Determination of carbonate and bicarbonate in the mixture.

4. Determination of alkali content in antacid using HCl.

5. Determination of Fe(II) using $K_2Cr_2O_7$.

6. Determination of Fe(II) using $KMnO_4$ with oxalic acid as primary standard.

7. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.

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HINDI MAHAVIDYALAYA

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(Affiliated to Osmania University)
Nallakunta, Hyderabad-44

B.Sc. II YEAR SEMESTER IV

DEPARTMENT OF CHEMESTRY

2017-2018

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2017-18 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATION

B.SC. BT MB CH /BC MB CH

SECOND YEAR SEMESTER-IV					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS401	A/B	SEC-1	2	2	2	40	30 min	10	50	-
BS402	English	CC-1D	5	5	3	80	30 min	20	100	-
BS403	Second Language (H/ S/ T)	CC-2D	5	5	3	80	30 min	20	100	-
BS404	BIO-CHEMISTRY / BIO- TECHNOLOGY	DSC-1D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	50
BS405	MICROBIOLOGY	DSC-2D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	50
BS406	CHEMISTRY	DSC-3D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	50
	TOTAL NO. OF CREDITS			27		440		110	700	
	TOTAL NO. OF CREDITS			**54**						

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B.Sc. II Year Semester – IV
CHEMISTRY
Paper-IV

Code: BS 406 **DSC-3D**

Instructions:	
Theory Classes	**4 Hrs/Week**
Practical Classes	**2 Hrs/Week**
Credit for Theory	**4**
Credit for Practical	**1**
Duration of Semester Examination	**3 Hrs**
Duration of Internal Examination	**30 Min**
Semester Examination Marks	**80 Marks**
Internal Examination Marks	**20 Marks**

Objective: The course is aimed at exposing the students to some basic knowledge in each branch of chemistry.

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 $[Ni(NH_3)_4]^{2+}$, $[NiCl_4]^{2-}$ 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).
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$[MA_2B_2]$, $[MA_2BC]$, $[M(AB)_2]$, [MABCD]. (ii) Octahedral metal complexes of the type $[MA_4B_2]$, $[M(AA)_2B_2]$, $[MA_3B_3]$ 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.

S4-I-2:Organometallic Chemistry **4h**

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 **4h**

18 valence electron rule, classification of metal carbonyls: $Ni(CO)_4$, $Fe(CO)_5$, $Fe_2(CO)_9$, $Fe_3(CO)_{12}$ and $Cr(CO)_6$, Preparation and properties of Ni(CO)4.

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UNIT - II (Organic chemistry) **15 h (1 hr/week)**

S4-O-1: Carboxylic acids and derivatives **6h**

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 **3h**

Acidity of -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.

6 h

S4-O-3: Nitro hydrocarbons:

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 Kholrausch'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.

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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 (G, H 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.

5 h

S4-G-2: Synthetic Strategies

Terminology – Target molecule (TM), Disconnection approach – Retrosynthesis, Synthon, 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 stereoslective reactions: substrate, product stereoselective reactions, enantio and diastereo selective reactions. Stereospecific reaction – definition – example – dehalogenation of 1,2-dibromides induced by iodide ion. Enantoselective reactions – definition – example –Reduction of Ethylacetoacetate by Yeast. Diastereoselective reaction-definition-example:Acid catalysed dehydration of 1-phenylproponal and Grignard addition to 2-phenyl propanal. Definition and explanation of enantiomeric excess and diastereomeric excess.

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References:

Unit- I

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

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B.Sc. II Year Semester – IV

CHEMISTRY Practical Paper- IV

Quantitative Analysis - II

Code: BS406P	
Instruction :	**3 Hrs / Week**
Duration of Exam	**3 Hrs**
Marks for Exam	**50 Marks**
Laboratory Course	**45 Hrs**

1. Conductometry titrations:
   i) Strong acid Vs Strong base;
   ii) Weak acid Vs Strong base.

2. Potentiometry titration:
   iii) Strong acid Vs Strong base;
   iv) 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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B.Sc II Year Semester - IV
CHEMISTRY

Scheme of Model Question Paper

Time – 3 Hrs **Max. Marks: 100**

Semester Exam Pattern **80 Marks**

Section – A 8 Short Answer Questions ------ Answer any four 5 X 4 = 20 Marks
Each carries 5 marks

Section—B 4 Long answer questions -----with internal choice 4 X 15 = 60 Marks
Each carries 15 Marks

Total Marks = 80

Internal Assessment Pattern **20 Marks** **Duration - 30 Min**

In Internal Assessment there will be 3 sections

Sections A 10 –Multiple choice questions 10 X ½ =5 Marks

Section –B 10—Fill in the Blanks 10 X ½ =5 Marks

Section –C 5 - Short Answer Questions 5 X 1= 5Marks

15 Marks

Two Internal Assessment Average is to be considered $\frac{15+15}{2}$ = 15 Marks

One Assignment to be given 5 Marks

Internal Assessment Total 20 Marks

Note: Equal Weightage has to be given to all units in each semester

Pooja

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CHEMISTRY
Paper – IV
Theory Question Paper Pattern

Time: 3 hrs | Max. Marks: 80

SECTION A

I Write any Four of the following (Short Questions) 4 X5 = 20 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 Essay Questions. Answer all the Questions 4 X 15= 60 Marks

9 (a) A Question from Unit I
(OR)
(b) A Question from Unit I

10. (a). A Question from Unit II
(OR)
(b). A Question from Unit II

11 (a) A Question from Unit III
(OR)
(b) A Question from Unit III

12 (a) A Question from Unit IV
(OR)
(b) A Question from Unit IV

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(AUTONOMOUS)
B.Sc. II Year Semester – IV
CHEMISTRY
Paper- IV
Quantitative Analysis - II
Practical Model Question Paper

Time: 3Hrs **Total Marks: 50**

I Write brief procedure along with principle involved in the following experiment. **6M**

1.Determine the strength of given strong acid (HCl) by a conductometriy titration against a standard 0.5 M NaOH solution.
2. Determine the concentration of given weak acid (CH_3COOH) by conductometry titration against a standard solution of NaOH.
3. Determine the strength of Hydrochloric acid by a potentiometry titration against sodium hydroxide.
4. Determine the strength of acetic acid by a potentiometry titration against sodium hydroxide.
5. Determination of Ni(II) using EDTA.
6. Determination of Barium ion gravimetrically.

II Estimate the amount in the given following experiments. **34M**

1.Determine the strength of given strong acid (HCl) by a conductometriy titration against a standard 0.5 M NaOH solution.
2. Determine the concentration of given weak acid (CH_3COOH) by conductometry titration against a standard solution of NaOH.
3. Determine the strength of Hydrochloric acid by a potentiometry titration against sodium hydroxide.
4. Determine the strength of acetic acid by a potentiometry titration against sodium hydroxide.
5. Determination of Ni(II) using EDTA.
6. Determination of Barium ion gravimetrically.

III Record & Vivavoice **10M**

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B.Sc. II Year Semester – IV
CHEMISTRY
Paper- IV
Quantitative Analysis – II
Practical Question Bank

1. Determine the strength of given strong acid (HCl) by a conductometriy titration against a standard 0.5 M NaOH solution.

2. Determine the concentration of given weak acid (CH_3COOH) by conductometry titration against a standard solution of NaOH.

3. Determine the strength of Hydrochloric acid by a potentiometry titration against sodium hydroxide.

4. Determine the strength of acetic acid by a potentiometry titration against sodium hydroxide.

5. Determination of Ni(II) using EDTA.

6. Determination of Barium ion gravimetrically.

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Skill Enhancement Course - I

CHEMISTRY OF COSMETICS & PERFUMES

Credits: 02 (2HPW) 30 Lectures

Objective: Aim of the course to give the knowledge of preparation of cosmetics.

UNIT I 10h

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours.

UNIT II 10h

Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.

Practicals 10h

1. Preparation of talcum powder.
2. Preparation of shampoo.
3. Preparation of enamels.
4. Preparation of hair remover.
5. Preparation of face cream.
6. Preparation of nail polish and nail polish remover.

Reference Books:

- E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
- P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- B.K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut.

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B.Sc. II year Semester – III

CHEMISTRY OF COSMETICS & PERFUMES

SEC 1 - INTERNAL MODEL PAPER

TIME: 1/2 HOURS | MAX MARKS: 10

SECTION-A

FILL IN THE BLANKS: 5 x ½ =5 marks

TEN (10) FIB ½ MARK EACH

SECTION-B

MULTIPLE CHOICE QUESTIONS 5 x ½ =5 marks

TEN (10) MCQ ½ MARK EACH

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B.Sc. II year Semester – III

CHEMISTRY OF COSMETICS & PERFUMES

SEC - 1 **Credits – 2**

SEC - THEORY MODEL PAPER

TIME: 2 HOURS **MAX MARKS: 40 (25T+ 15P)**

SECTION-A

Answer the following Questions in short: **2 ½ x 2 = 5 marks**

1. UNIT - I

2. UNIT - II

SECTION-B

Answer the following essay type questions: **2 x 10 = 20 marks**

1 (a) UNIT – I OR (b) UNIT - I

2 (a) UNIT – II OR (b) UNIT - II

*****

SEC -1 PRACTICAL

1. Preparation of the given Cosmetic. **15 MARKS**

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Skill Enhancement Course - II

PESTICIDE CHEMISTRY

Credits: 02 (2HPW) 30 Lectures

Objective : Aim of the course is to make the student aware of the synthesis and uses of pesticides used in agricultural fields.

UNIT I 10h

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship,

UNIT II 15h

Synthesis and technical Manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene); Organophosphates (Malathion, Parathion) Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

Practicals 5h

1 To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.

2 Preparation of simple organophosphates, phosphonates and thiophosphates

Reference Book:

- R. Cremlyn: Pesticides, John Wiley

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B.Sc. II year Semester – IV

PESTICIDE CHEMISTRY

SEC - 2 - INTERNAL MODEL PAPER

TIME: 1/2 HOURS

MAX MARKS: 10

SECTION-A

5 x ½ =5 marks

FILL IN THE BLANKS:

TEN (10) FIB ½ MARK EACH

SECTION-B

5 x ½ =5 marks

MULTIPLE CHOICE QUESTIONS

TEN (10) MCQ ½ MARK EACH

*****

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B.Sc. II year Semester – IV

PESTICIDE CHEMISTRY

SEC - 2 Credits – 2

SEC - THEORY MODEL PAPER

TIME: 2 HOURS MAX MARKS: 40 (25T+ 15P)

SECTION-A

Answer the following Questions in short: 2 ½ x 2 = 5 marks

1. UNIT - I
2. UNIT - II

SECTION-B

Answer the following essay type questions: 2 x 10 = 20 marks

1 (a) UNIT – I OR (b) UNIT - I

2 (a) UNIT – II OR (b) UNIT - II

*****

SEC -2 PRACTICAL

. Preparation of the given pesticides **15 MARKS**

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S.No.	Name and Designation	Mobile No.
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