HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad-44

B.Sc. III YEAR

SEMESTER V &VI

DEPARTMENT OF CHEMISTRY

2018-2019

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
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Head Department of Chemistry
Hindi Mahavidyalaya
Nallakunta, Hyderabad.

University Nominee
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Chairperson – BOS
Department of Chemistry
Osmania University, Hyderabad.

Ch. Sarala Devi
Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

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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
   Loan providing Officer
   SBI Head Office Mumbai

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COMPOSITION OF THE BOARD OF STUDIES IN AN AUTONOMOUS COLLEGE

1. **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. Ch. Sarala Devi, Chairperson, BOS, Dept. of Chemistry, Osmania University, Hyderabad.

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.

Ch. Sarala Devi

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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 semester V and VI

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 Semester V (Paper V & VI) ,Semester VI(Paper VII & VIII), SEC(3 & 4) and GE(1 & 2)., SEC (1&2)

4.7 Discussion on Practical exam model paper for Semester V (Paper V & VI) . Semester VI (Paper VII & VIII).

4.8 Panel of Examiners

4.9 Any other matter

4.10 Vote of Thanks

Ch. Sandhya Devi

Chairperson

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DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES
Academic Year – 2018-19

Minutes of BOS Meeting

BOS meeting of the Department of Chemistry was held on Tuesday 10th July 2018 at 11:00AM

The following members were present

Prof. Ch. Sarala Devi	-	University Nominee
Smt. Pooja Kaushal	-	Chairperson
Dr. Kiranmai	-	Member of BOS
Dr. K. Radha	-	Member of BOS

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Osmania University, Hyderabad

4.1 Welcome address by the chair

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

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 and III & IV 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.

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 V and VI

i. Members were informed by the chair that Department of Chemistry, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University for B.Sc. III Year, Semester V and VI.

ii. The syllabus comprises of 3 units each of core and elective. There are two electives (A & B) for each semester from which any one elective can be choosen.

Syllabus copy for both the semesters is enclosed.
Syllabus was approved by the Members of BOS. ,

4.5 Marks allotted for Internal and end Semester exams.

1. Internal assessment is of 15 marks. In each Semester two internal assessments 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 60 marks.
3. Total allotted marks are 75 for each theory paper DSC/DSE (A&B).
4. Internal assessment is of 10 marks for SEC & GE. One internal assessment of 10 Marks will be conducted and added in the marks of theory exam.
5. Theory Question paper for SEC & GE is of 40 marks.
6. Total allotted marks are 50 for each SEC & GE.

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

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

1. It was informed by the department that as per Osmania University CBCS guidelines there is no assignment for 3 credits core and elective papers. In each Semester Two Internal exams will be conducted for 15 marks. The internal assessment will have three sections.

Section– A 10 Multiple choice questions, each carries ½ marks (10X½ = 5M)
Section– B 10 Fill in the blanks, each carries ½ marks (10X ½ = 5M) and
Section– C 05 short notes, each 1mark (5X1=5)

Average of marks of these two internal exams will be taken.

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Board of Studies in Chemistry

2. Semester exam will be conducted as per the Almanac which will be provided by the exam branch. Internal exam duration will be 30Mnts and Semester exam duration will be of 3 hrs.

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

   (i) Section A contains 8 short Questions. The student has to answer five questions. Each Question carries 3 Marks (5X3=15 Marks).

   (ii) Section B contains 3 Essay type Questions with internal choice. Each Question carries 15 Marks (3X15=45 Marks).

4. Model Question paper for SEC Semester V and Semester VI was discussed. Theory paper for each SEC will have 2 sections.

   (i) Section A contains 2 short Questions. The student has to answer TWO questions. Each Question carries 5 Marks (2X5=10 Marks)

   (ii) Section B contains 2 Essay type Questions with internal choice. Each Question carries 15 Marks (2X15=30 Marks)

- Pattern of Model Theory Question Papers for DSC (V &VII), DSE (VI & VIII A/B), and SEC Paper 3 and Paper 4 &GE are enclosed.
- Pattern of Model Theory Question Papers for DSC, DSE, GE &SEC was approved by Members of BOS.

4.7 Discussion on Practical Exam Model paper.

- The practical examination held for B.Sc III year (semester V&VI) will have the pattern of 50 marks and the credit will be 1. The duration of the exam will be 2 hrs.
- The Practical model paper of , Sem V(Paper V & VI) and Sem VI(Paper VII & VIII) was approved by the Member of BOS.

4.8 Panel of Examiners

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

4.9 Any other matter.

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4.10 Vote of Thanks

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

Chairperson | University Nominee | Members | Principal

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Dept of Chemistry
Osmania University, Hyd-07.

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HINDI MAHAVIDYALAYA

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Nallakunta, Hyderabad-44

ACADEMIC YEAR 2018-19

CBCS STRUCTURE for 2016-17 BATCH

B.SC. BIOTECHNOLOGY/ BIOCHEMISTRY, MICROBIOLOGY, CHEMISTRY

THIRD YEAR SEMESTER- V					Semester End exam		Continuous Internal Evaluation		Total	Practical 2 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS501	Materials and their Applications	SEC-3	2	2	2	40	30 min	10	50	-
BS502	Pharmaceuticals (for B.Sc. NON CHEMESTRY B.A./B.Com./B.B.A. Students)	GE-1	2	2	2	40	30 min	10	50	-
BS503	BIOTECHNOLOGY/BIOCHEMISTRY– V	DSC-1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS504	MICROBIOLOGY - V	DSC-2E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS505	CHEMISTRY-V	DSC-3E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
	Laboratory Course (Organic Synthesis and TLC)									
BS506	BIOTECHNOLOGY/BIOCHEMISTRY – VI A/B	DSE- 1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS507	MICROBIOLOGY- VI	DSE-2E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS508	CHEMISTRY-VI A/B	DSE-3E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
A	INSTRUMENTAL METHOD OF ANALYSIS									
B	INDUSTRIAL CHEMISTRY AND CATALYSIS									
	Laboratory Course (Experiments in Physical Chemistry - I)									
			34	28		440		110	850	-

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF CHEMISTRY

B.SC. CHEMISTRY III YEAR
SEMESTER - V
SKILL ENHANCEMENT COURSE- III

Code: BS501
HPW: 2T

Credits:2
30 Hrs

MATERIALS AND THEIR APPLICATIONS

Objective: Aim of the course to give the knowledge about materials and their applications.

Unit – I: Types of Materials **15 Hrs.**

Introduction: Materials and their importance. Classification of Materials, Advanced materials and their need.

Types of Materials: Metals, ceramics, polymers and composites; Nature of bonding (Type of bond present).

Types and applications of metal alloys: Classification- ferrous and non-ferrous alloys. Ferrous alloys -types and their applications. Non-ferrous alloys – Cu, Al, Ti alloys, their applications and super alloys.

Field Work- Collection of Metal Alloy Samples

Types and Applications of Ceramics: Classification of Ceramics based on their application-glasses, clay products,refractories, abrasives, cements, and advanced ceramics.

Glasses: Compositions and Characteristics of Some of the Common Commercial Glasses; Properties and applications of glass ceramics - preparation of charts depicting various types of glass and their use.

Clay products: Structural clay products and the white wares.

Refractories: Compositions of four Common Ceramic Refractory Materials, fireclay, silica, basic refractories ex. MgO and special refractories ex. Alumina and Zirconia

Cements: Classification, preparation of cement and the setting process: quick setting cements: applications.

Field Work-Visit to industries and collection of samples of materials

Ch. Sunita Devi
Chairperson
Board of Studies in Chemistry

Unit - II Types of Polymers and Applications **15 Hrs**

Classification of Polymeric materials based on application: Coatings, adhesives, films, foams examples.

Polymer Additives: Fillers, Plasticizers, Stabilizers, Colorants, Flame Retardants with examples.

Advanced Materials: Types of advanced materials - semiconductors, bio-compatible materials, smart materials, advanced polymeric materials and nano-engineered materials.

Biocompatible materials: Definition. Materials used as biomaterials and their properties. Metals and alloys used in bone and joint replacement. Filling and restoration materials – dental cements, dental amalgams, dental adhesives.

Field Work- Visit to Dental Clinics and interaction with Doctors regarding materials used in Dental treatments

Smart materials: Shape memory alloys- definition and examples (Ni-Ti alloys, Cu based alloys), application.

Conducting polymers: - Introduction, Electrically conducting polymers and their uses (polyaniline, polypyrrole, polyacetylene and polythiophene).

References:

1. Materials Science and Engineering An Introduction by William D. Callister, Jr. John Wiley & Sons, Inc.
2. Material Science by Kakani and Kakani New Age International Pvt Ltd, 2004
3. Sujata V., Bhat., "Biomaterials", Narosa Publication House, New Delhi, 2002
4. M. V. Gandhi and B. S. Thompson, "Smart Materials and Structures", Chapman and Hall. London, First Edition, 1992.
5. Duerig.T.W., Melton, K. N, Stockel, D. and Wayman, C.M., "Engineering aspects of Shapememory Alloys", Butterworth – Heinemann, 1990.
6. Chandrasekhar. Prasanna Ashwin-Ushas Conducting Polymers, Fundamentals and Applications A Practical Approach Authors: Corp., Inc. Kluwer Academic Publishers. Boston

Principal

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF CHEMISTRY
SEMESTER V
GENERIC ELECTIVE (GE) COURSE - I

PHARMACEUTICALS

Code: BS502 **Credits:2**
HPW: 2T

Objective: Aim of the course to give the brief knowledge about medicines to other faculties other than science.

Unit – I: General Characteristics of Drugs **15Hrs.**

Introduction - Diseases – causes of diseases, Drug – definition and sources.

ADME of drugs (brief) – Absorption, distribution, drug action (site of action), metabolism (in liver), elimination (brief).

Examples (i) Zintac (Ranitidine, antacid) (ii) Paracetamol (antipyretic) (iii) Benadryl (Cough syrup). Characteristics of an ideal drug.

Nomenclature of drugs – chemical name – generic name – trade name. Trade names for the given generic names – (i) Aspirin (ii) Amoxycillin (iii) Ciprofloxacin (iv) Paracetamol (v) Mebendazole

drug formulations: Definition – need for conversion of drug into medicine (drug formulations) – Additives – diluents, binders, lubricants, antioxidants, flavourants, sweeteners, colourants, coating agents. Classification of Drug formulations: oral, parenterals and topical dosage forms -- advantages and disadvantages.

(i) Oral Dosage forms: Tablets (Aspirin – analgesic; Ciprofloxacin - antibacterial). Capsules (Amoxycillin – antibiotic; Omeprazole-antacid). Syrups (B-complex syrup; Benadryl- Cough syrup).
(ii) Parenterals (Injection forms): Propranolol (antihypertensive), Heparin (anticoagulant)
(iii) Topical dosage forms: Creams and Ointments
(iv) Antiallergic: Aclometasone (Aclovate), Betamethasone valerate(2%) Multiple purposes. **(v)Anti-itching**: Doxepin Zonalon). **Antifungal**: Miconozole (Dactarin, Neomicol). Ketoconazole, (Nizoral Cream), Fluconazole. **Anesthetic**- Lidocaine, (Lidocaine ointment) and **Antiseptic**: Boro Plus Cream, For burns -Iodine ointment

Ch. Sarala Devi

Unit – II: Classification of Drugs **15Hrs**

Classification of Drugs based on therapeutic action–Chemotherapeutic agents, Pharmacodynamic agents and drugs acting on metabolic processes. (brief explanation for the following)

(i) Chemotherapeutic agents: Antimalarials – Chloroquine; Antibiotic – Amoxicillin; Antitubercular drugs – isoniazide; Antiprotozoals – metronidazole

(ii) Pharmacodynamic agents

(a) Drugs acting on CNS: Diazepam (CNS depressant). General anesthetic (thiopental sodium), antipyretic and analgesic (Iburofen)
(b) Drugs acting on PNS : local anaestheties (Benzocaine)
(c) Drugs acting on cardiovascular system : Metoprolol (antihypertensive agents), Nefidipine antianginal and antihypertensive agent)
(d) Drugs acting on renal system: Diuretics (Acetazolamide)

(iii) Drugs acting on metabolic processes

(a) Vitamins: Common name, source, deficiency, vitamin A, B2, B6, C, D, E and K – remedy
(b) Hormones: Function (brief) - deficiency of hormones (Insulin, Testosterone and Osterone)

References:

1. Drugs by G.L.David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K.L.N.Reddy, C.Sudhakar.Universities Press (India) Limited 2007.
2. An Introduction to Medicinal Chemistry by Graham L. Patrick, Oxford University Press, New York. 1995
3. Chemistry text book for B.Sc., Vol. IV published by Telugu Academy, Govt. of Telangana

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DEPARTMENT OF CHEMISTRY
B.SC. III YEAR SEMESTER – V

SEC 3 & GE - 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. III YEAR SEMESTER V

SEC 3 & GE - 1- THEORY MODEL PAPER

MAX MARKS -40

TIME: 2 HOURS

SECTION-A

2 x 5 =10 marks

Answer the following Questions in short:

1. UNIT - I
2. UNIT - II

SECTION-B

2 x 15 = 30 marks

Answer the following essay type questions:

1 (a) UNIT – I OR (b) UNIT - I
2 (a) UNIT – II OR (b) UNIT - II

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER V
PAPER-V

Code: BS505 | **DSC-3E**
HPW: 3T+2P | **Credits:3T+1P**
45hrs

OBJECTIVE: To give in depth knowledge of all branches of chemistry to B.Sc III year students.

Unit-I (Inorganic Chemistry) **15 h**

S5-I-1: Coordination compounds –II

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.

Magnetic properties of transition metal complexes- para, dia, ferro, anti ferromagnetic properties, determination of magnetic susceptibility (Guoy method), spin only formula, calculations of magnetic moments.

Electronic spectra of metal complexes – colour of transtion metal aqua complexes– d-d transitions.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 of metal complexes –stepwise and overall stability constant and their relationship. Factors effecting the stability constants. Chelate effect, determination of composition of complex by Job's method and mole ratio method.

Applications of coordination compounds

Applications of coordination compounds 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.

S5-I-2: Molecular spectroscopy

Introduction to electromagnetic radiation, interaction of electromagnetic radiations with molecules, various types of molecular spectra.

Rotational spectroscopy (Microwave spectroscopy)

Rotational axis, moment of inertia, classification of molecules (based on moment of inertia), rotational energies, selection rules, determination of bond length of rigid diatomic molecules eg. HCl.

Infrared spectroscopy

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic 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.

Unit-II (Organic Chemistry) **15 h**

S5-O-1: Amines, Cyanides and Isocyanides

Amines:

Nomenclature, classification into 1^0, 2^0, 3^0Amines and Quarternary ammonium compounds.Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 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. 4. Chemical Properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation. 5. Reaction with Nitrous acid of 1^0, 2^0, 3^0 (Aliphatic and aromatic amines). Electophilic substitutions of Aromatic amines – Bromination and Nitration, oxidation of aryl and 3^0 Amines, diazotisation. 6. Diazonium salts: Preparation with mechanism. Synthetic importance – a) Replacement of diazonium group by – OH, X (Cl)- Sandmeyer and Gatterman reaction, by fluorine (Schiemann's reaction), by iodine, CN, NO_2, H and aryl groups. Coupling Reaction of diazonium salts. i) with phenols ii) with anilines. Reduction to phenyl hydrazines.

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 c) reduction d) oxidation.

S5-O-2: Heterocyclic Compounds

Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan, Thiophene and pyrrole. Importance of ring systems – 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 pyrrol, electrophillic 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 ,Bacisity –Aromaticity –comparison with pyrrole one method of preparation and properties-Reactivity towards Nucleophilic substitution reaction –chichibabin reaction.

Electronic spectroscopy:

Bonding and antibonding molecular orbitals,electronic energy levels of molecules (σ, π, n).types of electronic transitions: σ-σ^*, n-σ^*, n-π^*, π-π^* with suitable examples. Selection rules, Terminology of chromophore, auxochrome, bathochromic and hypsochromic shifts. Absorption of characteristics of chromophones: diene, enone and aromatic chromophores. Representation of UV visible spectra.

Unit-III(Physical Chemistry) **15hrs**

S5-P-1: Chemical Kinetics

Introduction to chemical kinetics, rate of reaction, variation of concentration with time, rate laws and rate constant. Specific reaction rate.Factors influencing reaction 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 reaction.

First order reaction, derivation of equation for rate constant. Characteristics of first order reaction. Units for rate constant. Half- life period, graph of 1st order reaction, examples. Decomposition of H_2O_2 and decomposition of oxalic acid.

Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problems. Second order reaction, derivation of expression for 2nd order rate constant, examples-Saponification of ester, $2O_3 \rightarrow 3O_2$, $C_2H_4 + H_2 \rightarrow C_2H_6$. Characteristics of second order reaction, units for rate constants, half- life period and second order plots.

Zero order reaction: derivation of rate expression, examples i)combination of H_2 and Cl_2 to form HCl, ii) thermal decomposition of HI on gold surface characteristics of Zero order reaction units of k, half-life period and graph, problems.

Determination of order of reaction: i) method of integration, ii) half life method, iii) Vant-Hoff differential method iv) Ostwald's isolation method. Problems

Kinetics of complex reactions (first order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions. Problems.

Effect of temperature on reaction rate, Arrhenius equation. Temperature coefficient. Concept of energy of activation, determination of energy of activation from Arrhenius equation and by graphical method, problems.Simple collision theory based on hard sphere model explanation of frequency factor, orientation or steric factor. The transition state theory (elementary treatment).

S5-P-2 Photochemistry

Introduction to photochemical reactions, Difference between thermal and photochemical reactions. Laws of photo chemistry- Grotthus - Draper law, Stark – Einstein's Law of photo chemical equivalence. Quantum yield. Examples of photo chemical reactions with different quantum yields. Photo chemical combinations of $H_2 - Cl_2$ and $H_2 - Br_2$ reactions, reasons for the high and low quantum yield. Problems based on quantum efficiency. Consequences of light absorptions. Singlet and triplet states. Jablonski diagram Explanation of internal conversion, inter- system crossing, Phosphorescence, fluorescence.

Ch. Sarala Devi
Chairperson
Board of Studies in Chemistry
Post Graduate Department
Andhra University

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. Van Nostrand Reinhold Company(1977)
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001). Chem.
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
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).

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 of organic chemistry by Bruice Yuranis Powla. (2012)

Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011).
3. Text Book of Physical Chemistry by Puri,Sharmaand Pattania. chand and Co.(2017)
4. Physical Chemistry by Atkins & De Paula, 8th Edition
5. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
6. Physical Chemistry through problems by S.K. Dogra. (2015)
7. Text Book of Physical Chemistry by R.P. Verma.
8. Elements of Physical Chemistry byLewis Glasstone. Macmillan (1966)
9. Basics of Chemical Kinetics by G.L. Agarwal, New Delhi : Tata-McGraw-Hill. 1990.
10. Kinetics and mechanism of chemical transformations by Rajaram & Kuriacose, Macmillan/Laxmi Publications (P) Ltd., New Delhi(2010)

Unit IV

1. Bioinorganic Chemistry. M.N.Huges, Hussain K. Reddy(2013)
2. Organic spectroscopy. William Kemp, Palgrave Macmillan: 2nd Revised edition edition (1 February 1987)
3. Text Book of Physical Chemistry by Puri,Sharmaand Pattania. chand and Co.(2017)
4. Photochemistry by Gurdeep Raj. Goel publishing house, 5th edition

Chairperson

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc. III Year Semester – V
Chemistry – Paper –V
Discipline Specific Core (DSC)

Theory Question Paper Pattern

Time: 3 hrs **Max. Marks: 60**

SECTION A

I Write any Five of the following (Short Questions) **5 X 3 = 15 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 any of the three unit
8. A Question from any of the three unit

SECTION B

II Essay Questions. Answer all the Questions **3 x 15 = 45 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

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER V
PAPER-V
LABORATORY COURSE:

Code: BS505P
HPW: 2

Credits:1

(Organic Synthesis and TLC)(CHE 551)

30 h (2h/w)

1. **Synthesis of Organic compounds:**

Acetylation: Acetylation of salicylic acid. Benzoylation of Aniline.

Aromatic electrophilic substitution: Nitration: Preparation of 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 - β naphthyl methyl ether.

Condensation: Preparation of benzilidine aniline from Benzaldehyde and aniline.

Diazotisation: Azocoupling of β-Naphthol.

2. **Thin layer Chromatography**

Determination of Rf values and identification of organic compounds: preparation and separation of 2,4-dinitrophenyl hydrazones of acetione and 2-butanone using toluene and light petroleum(40:60)

Separation of ortho & para nitro aniline mixtures

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DEPARTMENT OF CHEMISTRY
B.SC III YEAR SEMESTER – V
CHEMISTRY – PAPER – V
ORGANIC SYNTHESIS AND TLC

PRACTICAL QUESTION PAPER PATTERN

Time: 2 hrs **Max. Marks: 50**

1. Write the principle and procedure of the given Preparation. 10 M

2. Write a brief procedure along with chemical equation and prepare a pure sample of the compound given and submit the crude & recrystallised samples . 25M

3. Record 5 M .
4. Viva 10 M

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER V
PAPER-VI
ELECTIVE - A

Code: BS508A
HPW: 3T+2P

DSE-3E
Credits:3T+1P

INSTRUMENTAL METHODS OF ANALYSIS

45Hrs

OBJECTIVE: To give knowledge about the instrumental methods of Chemistry and their principles.

Unit I: Chromatography I 15Hrs

S5-E-A-I: Solvent Extraction- Principle, Methods of extraction: Batch extraction, continuous extraction and counter current extraction. Application–Determination of Iron (III).
Chromatography: Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.
Thin layer Chromatography (TLC): Advantages, preparation of plates, development of the chromatogram, Detection of the spots, factors effecting Rf values and applications.
Paper Chromatography: Principle, choice of paper and solvent systems, development of chromatogram – ascending, descending, radial and two dimensional chromatography and applications.

Chromatography II

Column Chromatography- Principle, Types of stationary phases, Column packing – Wet packing technique, Dry packing technique, Selection criteria of mobile phase solvents for eluting polar, non-polar compounds and its applications.
Ion exchange chromatography: Principle, cation and anion exchange resins, its application in separation of ions.
Gas Chromatography: Theory and instrumentation (Block Diagram), Types of stationary phases and carrier gases (mobile phase).
High performance liquid chromatography: Theory and instrumentation, stationary phases and mobile phases. Analysis of paracetamol.

Unit II: Colorimetry and Spectrophotometry 15Hrs

S5-E-A-II General features of absorption – spectroscopy, transmittance, absorbance, and molar absorptivity. Beer Lambert's law and its limitations, difference between Colorimetry and Spectrophotometry.
Instruments – Single beam UV- Visible Spectrophotometer, Double beam UV- Visible Spectrophotometer, Lamps used as energy sources, Verification of Beer's law, Estimation of iron in water samples by thiocyanate method, Estimation of (i) Chromium and (ii) Manganese in steel.
IR Spectrophotometer: Principle, Sources of Radiations, Sampling, Block diagram of FT-IR Spectrophotometer.

Ch. Satyanarayana

15Hrs

Unit III: Electroanalytical methods

S5-E-A-III: Types of Electroanalytical Methods.
I) **Interfacial methods** – a) Potentiometry: Principle, Electrochemical cell, Electrodes- (i) Indicator and (ii) Reference electrodes – Normal Hydrogen Electrode, Quinhydrone Electrode, Saturated Calomel Electrode. Numerical Problems. Application of Potentiometry – Assay of Sulphanilamide b) Voltametry: – three electrode assembly; Intoduction to types of voltametric techniques, micro electrodes. Over potential and Polarization.

II) **Bulk methods** – Conductometry, Conductivity Cell, Specific Conductivity, Equivalent Conductivity. Numerical Problems. Applications of conductometry, Estimation of Cl^- using $AgNO_3$, Determination of Aspirin with KOH.

Recommended Text Books and Reference Books

1. Analytical Chemistry by David Krupadanam, Universities Press (India) Limited.
2. D.A. Skoog, F.J. Holler, T.A. Nieman, Principles of Instrumental Analysis, Engage earning India Ed.
3. D. A. Skoog, D.M. West, F.J. Holler, Fundamentals of Analytical Chemistry 6th Ed., Saunders College Publishing, Fort worth (1992).
4. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental Methods of Analysis. 7th Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA, 1988.
5. Harris, D. C. Quantitative Chemical Analysis, W. H. Freeman.2007.
6. Dean, J. A. Analytical Chemistry Notebook, McGraw Hill.
7. Day, R. A. & Underwood, A. L. Quantitative Analysis, Prentice Hall of India.
8. Freifelder, D. Physical Biochemistry 2nd Ed., W.H. Freeman and Co., N.Y. USA, 1982.
9. Cooper, T.G. The Tools of Biochemistry, John Wiley and Sons, N.Y. USA. 16, 1977.
10. Vogel, A. I. Vogel's Qualitative Inorganic Analysis 7th Ed., Prentice Hall.
11. Vogel, A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Prentice Hall.
12. Robinson, J.W. Undergraduate Instrumental Analysis 5th Ed., Marcel Dekker, Inc, New York (1995).
13. Analytical Chemistry 7th edition by Gary D. Christian (2004).
14. B. K. Sharma, Industrial Chemistry (including Chemical Engineering). Edn. (1997).
15. M.N Sastry, Separation Methods, Paperback (2004), Himalaya Publications.

Usharani Analytical Chemistry Paperback (2000) Narosa Publication

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER V
PAPER-VI
ELECTIVE - B

Code: BS508B
HPW: 3T+2P

DSE-3E
Credits:3T+1P

INDUSTRIAL CHEMISTRY AND CATALYSIS

45 Hrs

OBJECTIVE: To give knowledge about the Industrial methods like metallurgic process & functions of catalysts.

Unit I: General Principles of Metallurgy and Production of Non Ferrous Metals 15 Hrs

S5-E-B-I: Pyrometallurgy: Drying and calcination, roasting, smelting, products of smelting. **Hydrometallurgy:** Leaching methods, leaching agents, leaching of metals, oxides and sulphides.

Separation of liquid and solid phases and processing of aqueous solutions Electrometallurgy: Electrolysis, Refining electrolysis, electrolysis from aqueous solutions, fused-salt electrolysis

Refining processes: Chemical and physical refining processes

Production of selected non-ferrous metals (Copper, Nickel, Zinc): Properties, raw materials, production (flow charts presentations and chemical reactions involved) and uses.

Unit II: Natural and Synthetic Dyes 15 Hrs

S5-E-B-II: Classification of dyes. Sources of natural dyes: Indigoid, Anthraquinone , Naphthoquinone, Benzoquinone, Flavonoid, Carotenoid and Tannin-based dyes.

Synthetic Dyes: Acidic, basic, dispersive, direct, reactive and vat dyes with examples. Extraction of natural dyes and their sustainability: The different methods for extraction of coloring materials from natural dyes. Aqueous extraction, alkali or acid extraction, microwave and ultrasonic assisted extraction, fermentation, solvent extraction, super critical fluid extraction. Drying methods. Application of natural dyes on textiles, Mordanting- types of mordanting - metallic mordants, oil mordants. Tannins and Tannic acid. Present scenario and sustainability issues in usage of natural dyes and cost considerations.

Unit III: Catalysis I 15Hrs

S5-E-B-III: Homogeneous and heterogeneous catalysis - Definition of a catalyst and catalysis. Comparison of homogeneous and heterogeneous catalysis with specific examples. General characteristics of catalytic reactions.

Acid-base catalysis- Examples of acid and base catalysed reactions, hydrolysis of esters. Kinetics of acid catalysed reactions. Specific acid and general acid catalysis. Kinetics of base catalysed reactions. Specific base and general base catalysis. Examples-Aldol condensation and decomposition of nitramide, base catalysed conversion of acetone to di acetone alcohol. Effect of P^{H} on reaction rate of acid and base catalysed reactions.

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Phase transfer catalysis: Principle of phase transfer catalysis, classification of phase transfer catalysts. Factors influencing the rate of PTC reactions.

Catalysis II

S5-E-B-III: Enzyme catalysis- Characteristics of enzyme catalysis. Examples: (i) invertase in inversion of cane sugar (ii) Urease in decomposition of urea . Factors affecting enzyme catalysis. Effect of temperature, pH, concentration and inhibitor on enzyme catalysed reactions.

Kinetics of enzyme catalysed reactions: Michaelis-Menton Equation. Mechanism of enzyme catalysed reactions.

References

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
3. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
4. **Kateřina Skotnicová, Monika Losertová, Miroslav Kursa, Theory** of production of non-ferrous metals and alloys Study.
5. K Venkataraman, the Chemistry of Synthetic Dyes, Volume 4, Elsevier, Technology & Engineering.
6. Sujata Saxena and A. S. M. Raja by Natural Dyes: Sources, Chemistry, Application and Sustainability Issues.
7. Physical Chemistry by Atkins and De Paula, 8th Edn.
8. Physical Chemistry by Puri, Sharma and Pattania, 2017.
9. Kinetics and mechanism of chemical transformations by Rajarajm and Kuraiacose, Published by Macmillan India Ltd.
10. Text book of Physical Chemistry by K.L. Kapoor Macmillan, 1999.
11. Catalysis by J.C. Kuriacose, Macmillan Macmillan Publishers India Limited, 1980.

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(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc. III Year Semester – V
Chemistry – Paper –VI
DSE-(A / B)

Theory Question Paper Pattern

Time: 3 hrs **Max. Marks: 60**

SECTION A

I Write any Five of the following (Short Questions) **5 X 3 = 15 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 any of the three unit
8. A Question from any of the three unit

SECTION B

II Essay Questions. Answer all the Questions **3 x 15 = 45 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

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER V
PAPER-VI
LABORATORY COURSE:

Code: BS508P
HPW: 2 **Credits:1**

EXPERIMENTS IN PHYSICAL CHEMISTRY-I

30hrs

1. Distribution law

a) Determination of distribution coefficient of iodine between water and carbon Tetrachloride/determination of molecular status and partition coefficient of benzoic acid in Toluene and water.

b) Determination of distribution coefficient of acetic acid between n-butanol and water.

2. Electrochemistry

a) Determination of cell constant of conductivity cell.

b) Determinationofdissociationconstant(Ka)ofaceticacidbyconductivity measurements.

3. Colorimetry

Verification of Beer's law using $KMnO_4$ and determination of the concentration of the given solution.

4. Adsorption

Adsorption of acetic acid on animal charcoal, Verification of Freundlich adsorption isotherm.

5. Physical constants

Surface tension and viscosity of liquids. (Demonstration Experiment)

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DEPARTMENT OF CHEMISTRY
B.SC III YEAR SEMESTER – V
CHEMISTRY – PAPER – VI
EXPERIMENTS IN PHYSICAL CHEMISTRY -I

PRACTICAL QUESTION PAPER PATTERN

Time: 2 hrs **Max. Marks: 50**

1. Write principle and procedure for the given experiment. 10 M
2. Carryout the given allotted experiment with principle and brief procedure. 25 M
3. Record 05 M
4. Viva 10 M

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DEPARTMENT OF CHEMISTRY

B.SC CHEMISTRY III YEAR
SEMESTER – V
PAPER – V AND VI

INTERNAL EXAMINATION MODEL PAPER

Time – 30Min **Total Marks: 15M**

Multiple choice type: **10x ½ =5M**

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II Fill in the Blanks **10x ½ =5M**

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20.

III Define the following **5X1=5M**

21 22 23 24 25

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Osmania University, Hyderabad.

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HINDI MAHAVIDYALAYA

(AUTONOMOUS)
Affiliated to Osmania University
Nallakunta, Hyderabad-44

ACADEMIC YEAR 2018-19

CBCS STRUCTURE for 2016-17 BATCH

B.SC. BIOTECHNOLOGY/ BIOCHEMISTRY, MICROBIOLOGY, CHEMISTRY

THIRD YEAR SEMESTER- VI

Code	Course Title	Course Type	HPW	Credits	Semester End exam		Continuous Internal Evaluation		Total	Practical 2 HRS
					Duration in HRS	Marks	Exam Duration	Marks		
BS601	Chemistry of Cosmetics and Food Processing	SEC-4	2	2	2	40	30 min	10	50	-
BS602	Materials and Their Applications (for B.Sc. NON CHEMESTRY B.A./B.Com./B.B.A. Students)	GE-2	2	2	2	40	30 min	10	50	-
BS603	BIOTECHNOLOGY/BIOCHEMISTRY– VII	DSC-1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS604	MICROBIOLOGY - VII	DSC-2F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS605	CHEMISTRY-VII.									
	Laboratory Course (Quantitative and spectral analysis of organic Compounds)	DSC-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS606	BIOTECHNOLOGY/BIOCHEMISTRY– VIII	DSE- 1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS607	MICROBIOLOGY -VIII	DSE-2F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS608	CHEMISTRY-VIII A/B									
A	MEDICINAL CHEMISTRY									
B	AGRICULTURAL AND FUEL CHEMISTRY	DSE-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
	Laboratory Course (Experiments in Physical Chemistry - II)									
			34	28		440		110	850	-
	TOTAL Credits			164						

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
SKILL ENHANCEMENT COURSE- IV

CODE : BS:601 **Credits:2**
HPW: 2 **Total : 30 Hrs**

CHEMISTRY OF COSMETICS AND FOOD PROCESSING

Objective: Aim of the course is to make the students aware of the chemistry of cosmetics and food processing.

15 Hrs

Unit-I: Chemistry of Cosmetics and Perfumes

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, sunscreen lotions, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to eugenol, geraniol, sandalwood oil, eucalyptus, 2-phenyl ethyl alcohol. Demonstration experiments or illustration of experimental procedures through charts for the preparation of talcum powder, shampoo and vanishing cream. Analysis of deodorants and antiperspirant - Aluminum, Zinc, Boric acid, Chloride and Sulphide.

15 Hrs

Unit-II: Food Processing and Food Adulteration

Food processing: Introduction, methods for food processing, additives and preservatives. Food processing- impact on nutrition, analysis of calcium in milk by complexometric titration, spectrophotometric analysis of iron in foods, Spectrophotometric identification and determination of caffeine and benzoic acid in soft drinks.

Field Work -Visit to Food Industries.

Food adulteration: Adulterants in some common food items and their identification: Pulses, chilli powder, turmeric powder, milk, honey, spices, food grains and wheat flour, coffee powder, tea leaves, vegetable oil, ghee, ice creams, tomato sauce.

Field Work-Collection of adulterated food samples, demonstration of a minimum of five experiments for testing adulterants in food items.

References

1. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
2. P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).
4. Rameen Devi, Food Processing and Impact on Nutrition, Sc J Agric Vet Sci., Aug-Sep 2015; 2(4A):304-311.
5. W.A. Poucher, Perfumes, Cosmetics and Soaps (1993).
6. Srilakshmi, Food Science, Edition: 3rd (2004).
7. Lillian Hoagland Meyer, Food chemistry (2008).
8. Handbook of Analysis and Quality Control for Fruit and Vegetable Products,S. Ranganna, Tata McGraw-Hill Education, 1986 – Food.
9. Fundamental concepts of applied chemistry J.C Ghosh, S. Chand and Co. Ltd, New Delhi.
10. Applied Chemistry K .Bhagavathi Sundhar, MJP publishers.

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
GENERIC ELECTIVE (GE) COURSE - II

CODE: BS:602 **Credits:2**
HPW: 2 **Total: 30Hrs**

MATERIALS AND THEIR APPLICATIONS

Objective: Aim of the course to give the brief knowledge about materials and their applications to other faculties other than science.

15 Hrs

Unit – I: Types of Materials

Introduction: Materials and their importance: Classification of Materials, Advanced Materials and their need.

Types of Materials: Metals, ceramics, polymers and composites; Nature of bonding (Type of bond present)

Types and applications of metal alloys: Classification: ferrous and non-ferrous alloys. Ferrous alloys-types and their applications. Non-ferrous alloys – Cu, Al, Ti alloys and their application, Super alloys.

Types and Applications of Ceramics: Classification of Ceramics based on their application-glasses, clay products, refractories, abrasives, cements and advanced ceramics.

Glasses: Compositions and characteristics of some of the common commercial glasses; Properties and applications of glass ceramics.

Clay products: Structural clay products and white wares.

Refractories: Compositions of four common ceramic refractory materials - fireclay, silica, basic refractories ex. MgO and special refractories ex. alumina and zirconia

Cements: Classification, preparation of cement and the setting process; quick setting cements and their applications.

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Unit - II Types of Polymers and Applications **15 Hrs**

Classification of polymeric materials based on application: Coatings, adhesives, films, foams with examples.

Polymer Additives: Fillers, plasticizers, stabilizers, colorants, flame retardants with examples

Advanced Materials: Types of advanced materials- semiconductors, bio-compatible materials, smart materials and advanced polymeric materials with examples.

Conducting polymers: Introduction, Electrically conducting polymers and their uses (polyaniline, polypyrrole, polyacetylene and polythiophene).

References:

1. William D. Callister Materials Science and Engineering An Introduction, John Wiley & Sons, Inc, 2006.
2. Material science by Kakani and Kakani.
3.Sujata V., Bhat., "Biomaterials", Narosa Publication House, New Delhi, 2002.
4.M. V. Gandhi and B. S. Thompson, "Smart Materials and Structures", Chapman and Hall, London, First Edition, 1992.
5. Duerig,T. W., Melton, K. N, Stockel, D. and Wayman, C.M., "Engineering aspects of Shapememory Alloys", Butterworth – Heinemann, 1990.
6. Conducting Polymers, Fundamentals and Applications A Practical Approach Authors: Chandrasekhar, Prasanna Ashwin-Ushas Corp., Inc. Kluwer Academic Publishers. Boston

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DEPARTMENT OF CHEMISTRY

SEC 4 & GE-2 - 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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DEPARTMENT OF CHEMISTRY

B.SC. III YEAR SEMESTER VI

SEC-4 & GE-2-THEORY MODEL PAPER

TIME: 2 HOURS **MAX MARKS: 40**

SECTION-A

Answer the following Questions in short: **2 x 5 =10 marks**

1. UNIT - I
2. UNIT - II

SECTION-B

Answer the following essay type questions: **2 x 15 = 30 marks**

1 (a) UNIT – I OR (b) UNIT - I
2 (a) UNIT – II OR (b) UNIT - II

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
PAPER-VII

CODE: BS:605 **DSC-3F**
HPW: 3T+2P **Credits:3T+1P**

Total: 45 Hrs

OBJECTIVE: The course is aimed at exposing the students to basic knowledge in all branches of Chemistry.

Unit-I (Inorganic Chemistry) **15 h**

S6-I-1:Inorganic reaction mechanisms

Labile and inert complexes, Thermodynamic and kinetic stability based on VBT & CFT: ligand substitution reactions – SN^1 and SN^2 in Octahedral complexes; substitution reactions of square planar complexes – Trans effect and applications of trans effect. Reactions of tetrahedral complexes - Hydrolysis of silicon halides and phosphorous oxides.

S6-I-2:Bioinorganic chemistry

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 storage – structure of hemoglobin, binding and transport of oxygen. Fixation of CO_2 in photosynthesis- overview.

S6-I-3:Hard and soft acids bases (HSAB)

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

S6-I-4: Proton Magnetic Resonance Spectroscopy

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, representation of proton NMR spectrum – Integrations. ^1H NMR spectrum of – ethyl bromide, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate and acetophenone.

UNIT - II (Organic Chemistry) **15h**

S6-O-1:Carbohydrates

Introduction: Classification and nomenclature – classification into mono, oligo and polysaccharides, into pentoses, hexoses *etc*., into aldoses and ketoses.

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 acids). Number of optically active, 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 aldehyde tests and mutarotation).

Cyclic structure of glucose: Proposition 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-n-hexane) Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure,Haworth formula).

Inter Conversion 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 – Aldopentose eg: D-glucose to D-arabinose by Ruff's degradation. Aldohexose(+) (glucose) to ketohexose (–)(Fructose) and Ketohexose (Fructose) to aldohexose (Glucose).

S6-O-2Amino acids and proteins

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 Leucene) by following methods: a) From halogenated Carboxylic acid b)Malonic ester synthesis c) streeker's synthesis.Physical properties: Optical activity of naturally occurring amino acids: L – configuration, irrespective of sign of rotation. Zwitter ion 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, peptide synthesis.

S6-O-3: Mass Spectrometry

Electron Impact Mass: Basic principles, Nitrogen rule, types of ions: Molecular ion, fragment ion and isotopic ions, representation of mass spectrum, types of peaks (molecular ion, fragment and isotopic ion peaks). Determination of molecular weight Mass spectrum of ethyl chloride, ethyl bromide and acetophenone.

Unit-III (Physical Chemistry) **15 h**

S6-P-1:Thermodynamics –I

A brief review of - Energy, work and heat units, mechanical equivalent of heat, definition of system, surroundings. I law of thermodynamics statement- various forms mathematical expression. Thermodynamic quantities- extensive properties and intensive properties, state function, 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 I law. Heat changes at constant pressure and heat changes at constant volume. Enthalpy. Heat capacities at constant pressure and constant volume. Derivation $C_p - C_v = R$.

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 and Joule-Thompson coefficient.

Adiabatic changes in ideal gas derivation of equation. PV^{γ} = 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 I law and need for II law. Statement of II law of thermodynamics. Cyclic process. Heat engine. Carnot's theorem. Carnot's cycle. Derivation of efficiency of heat engine problems. Thermodynamic scale of temperature.

S6-P-2: Thermodynamics- II

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 inert perfect gases. Free energy Gibb's function (G) and Helmholtz's function (A) as thermodynamic quantities. Concept of **maximum work and net work ΔG as criteria for spontaneity. Derivation of equation ΔG =ΔH – TΔS. significance of the equation.** Gibbs equations and the Maxwell relations. Variation of G with P, V and T.

References :

Unit- I

1. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
2. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
3. Metal Ions In Reaction mechanisms, K.Veera Reddy. Galgotia Publications Pvt Ltd(2004)

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 of organic chemistry by Bruice Yuranis Powla. 2nd Edition **(2012)**

Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011)
3. Text Book of Physical Chemistry by Puri, Sharmaand Pattania. chand and Co.(2017)
4. Physical Chemistry by Atkins & De Paula, 8th Edition, **2009**
5. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
6. Physical Chemistry through problems by S.K. Dogra. (2015)
7. Text Book of Physical Chemistry by R.P. Verma.
8. Elements of Physical Chemistry byLewis Glasstone. Macmillan (1966)
9. Thermodynamics by Rajaram. Vishal Publishing Co.(2013)

Unit IV

1. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
2. Organic Spectroscopy, William Kemp Palgrave Macmillan; 2nd Revised edition edition (1 February 1987)
3. Principles of physical chemistry by Prutton and Marron.(The Macmillan Company; 4th edition (1970)
4. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011).
5. Text Book of Physical Chemistry by Puri,Sharmaand Pattania. chand and Co.(2017)
6. Thermodynamics by Rajaram. Vishal Publishing Co.(2013)

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(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc III Year Semester – VI

Chemistry – Paper – VII
DSC
Theory Question Paper Pattern

Time: 3 hrs **Max. Marks: 60**

SECTION A

I Write any Five of the following (Short Questions) **5 X 3 = 15 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 any of the three unit
8. A Question from any of the three unit

SECTION B

II Essay Questions. Answer all the Questions **3 X 15 = 45 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

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
PAPER-VII
LABORATORY COURSE:

CODE: BS:605P
HPW: 2

Credits:1
Total: 30hrs

QUALITATIVE AND SPECTRAL ANALYSIS OF ORGANIC COMPOUNDS

Qualitative analysis: Identification of an Organic compound through the functional group analysis, determination of melting points/boiling points, functional group tests and preparation of suitable derivatives of the following:

Carboxylic acids, phenols, amines, urea, carbohydrates, aldehydes, ketones, amides and naphthalene.

Spectral analysis Determination of structures from combined spectral data (IR, ^{1}H-NMR and Mass): Minimum of five problems.

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DEPARTMENT OF CHEMISTRY
B.SC III YEAR SEMESTER – VI
CHEMISTRY – PAPER – VII
QUALITATIVE AND SPECTRAL ANALYSIS OF ORGANIC COMPOUND

PRACTICAL QUESTION PAPER PATTERN

Time: 2 hrs **Max. Marks: 50**

1. Identify the functional group present in the given organic compound ,and report its nature ,physical constant ,solubility & functional group tests .Prepare a solid derivative & submit. 25M

2. Solve the problem based on spectral analysis. 10M

3. Record 5M

4. Viva 10M

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
PAPER-VIII

CODE: BS: 608A | **ELECTIVE -A** | **DSE-3F**
HPW: 3T+2P | **Credits:3T+1P**
Total: 45Hrs

MEDICINAL CHEMISTRY

Objective: The course is aimed at exposing the students to give the knowledge of common diseases & relative drugs.

Unit- I: Introduction and Terminology **15h**

S6-E-A-I: Diseases: Common diseases, infective diseases–insect borne, air-borne, water-borne and hereditary diseases.

Terminology in Medicinal Chemistry: Drug, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, anti metabolites and therapeutic index.
Drugs: Nomenclature: Chemical name, Generic name and Trade names with examples.
Classification: Classification based on structures and therapeutic activity with examples.

ADME: a) Absorption: Definition, absorption of drugs across the membrane–active and passive absorption, routes of administration of drugs. b) Distribution: definition and effect of plasma protein binding. c) Metabolism: definition, phase I and phase II reactions. d) Elimination: definition and renal elimination.

Unit-II: Enzymes and Receptors **15h**

S6-E-A-II: Enzymes: Introduction. Mechanism and factors affecting enzyme action, Specificity of enzyme action (including stereo specificity), Enzyme inhibitors and their importance. Types of inhibition - reversible, irreversible and their subtypes with examples.

Receptors: Introduction, Drug action-receptor theory, Mechanism of drug action, concept of agonists and antagonists with examples. Drug receptor interactions involved in drug receptor complex. binding role of –OH group, $-NH_2$ group, quaternary ammonium salts and double bond. Structure – activity relationships of drug molecules, explanation with sulfonamides.

Molecular Messengers and Health Promoting Drugs
Molecular Messengers: Introduction to hormones and neurotransmitters, Thyroid hormones, Antithyroid drug-Carbimazol. Adrenaline: Adrenergic drugs- salbutamol, atenelol. Serotonin: SSRIs- fluoxetine.Dopamine: Antiparkinson drug- Levodopa.

Health promoting drugs: Introduction, sources, Deficiency disorders and remedy of Vitamins A,B, C, D, E K and micronutrients – Na, K, Ca, Cu, Zn and I.

Unit- III: Synthesis and Therapeutic Activity of Drugs **15h**

S6-E-A-III: Introduction, synthesis and therapeutic activity of :

Chemotherapeutics: Sulphanilamide, dapsone, Pencillin-G (semi synthesis), Chloroquin, Isoniazid, Cisplatin and AZT.

Anti inflammatory Drugs to treat metabolic disorders: Anti diabetic - Tolbutamide; Ibuprofen; Cardiovascular- Glyceryl trinitrate; Antipyretic (paracetamol, aspirin) and Antacid-Omeprazole.

Drugs acting on nervous system: Anaesthetics-definition, Classification-local and general. Volatile- Nitrous oxide, chloroform uses and disadvantages. Local anesthetics – benzocaine.

Reference books

1. G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, New York. 2013.
2. Thomas Nogrady, Medicinal Chemistry, Oxford Univ. Rress, New York.2005.
3. David William and Thomas Lemke, Foye's Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, 2008.
4. Ashutosh Kar Medicinal Chemistry, New Age International, 2005.
5. O.D.Tyagi & M.Yadav Synthetic Drugs by, Anmol Publications,1998.
6. Medicinal Chemistry by Alka L. Gupta, Pragati Prakashan.
7. G. L. David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K. L. N. Reddy, C. Sudhakar, Drugs, Universities Press (India) Ltd. 2012.

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
PAPER-VIII

CODE: BS:608B **ELECTIVE -B** **DSE-3F**
HPW: 3T+2P **Credits:3T+1P**

AGRICULTURAL AND FUEL CHEMISTRY 45Hrs.

Objective: To give knowledge of agricultural related chemicals & fuel.

15Hrs

Unit I: – Pesticides

S6-E-B-I: Introduction. Definition, classification of pesticides based on use (target). Toxicity and chemical structure with examples. Adverse effects of pesticides and its impact on environmental pollution.

Synthesis, technical manufacture and uses of representative pesticides in the following classes: Organochlorines (Cypermethrin); Organophosphates (Parathion); Carbamates (carbaryl); Quinones (Chloranil), Anilides (Alachlor).

Pesticide formulations: Dusts, Granules, Wettable powders, Emulsions and Aerosols.

Biopesteides : Introduction: Potential pesticidal plants of India, Role of Neem in plant protection-constituents, Azadirachtin and its role in pest control, Structure and mode of action of Pyrethrins (pyrethrin-1) and Pyrethroids (permethrin) and nicotinoids (Imidacloprid).

15 Hrs

Unit II: – Fertilizers

S6-E-B-II: Introduction: (need of fertilizers), functions of essential plant nutrients (N, P, K), Classification formula and uses of fertilizers:

Nitrogenous fertilizers: Ammonium nitrate, Urea, Calcium Cyanamide, Calcium Ammonium Nitrate, Sodium Nitrate, Ammonium Chloride and their uses.

Phosphate fertilizers: Normal super phosphate, Triple Super Phosphate, Ammonium Phosphate and their uses.

Potassium fertilizers: Potassium chloride, potassium nitrate, potassium sulphate and uses. **Complex fertilisers:** Diaammonium Phosphate and mixed fertilizers their uses. Manufacture of urea and Super phosphate of lime and their reactions in the soil.

Biofertilizers – Introduction, definition, classification, Rhizobium, Azatobactor, Azospirillium, Azolla, Blue Green Algae, Vermicomposting and uses.

Organic farming: The principal methods, crop rotation, green manures and compost, biological pest control, and mechanical cultivation and uses.

15 Hrs.

Unit III: Energy Sources and Coal

S6-E-B-III: Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.

Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas—composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke. Coal gasification (Hydro gasification and Catalytic gasification). Coal liquefaction and Solvent Refining.

troleum, Petrochemical Industry and Lubricants

Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.

fractional Distillation - Principle and process, Cracking - Thermal and catalytic cracking, Reforming of Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene and their uses.

Lubricants: Classification of lubricants, Properties and functions of lubricants (viscosity index, cloud point, pour point) and their determination. Lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants.

Reference books

1. N. N. Melnikov, Chemistry of pesticides; Springer-Verlag- Technology & Engineering (2012).
2. Thomas A. Unger Pesticide Synthesis Handbook; Elsevier, (2000).
3. R. Cremlyn Pesticides; John Wiley, 1980.
4. A. K. Kolay Manures and Fetrtilisers; Published by Atlantic (2007).
5. Stocchi, E. Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK (1990).
6. Jain, P.C. & Jain, M. Engineering Chemistry Dhanpat Rai & Sons, Delhi.
7. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).

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DEPARTMENT OF CHEMISTRY
B.Sc III Year Semester – VI

Chemistry – Paper – VIII
DSE (A / B)
Theory Question Paper Pattern

Time: 3 hrs **Max. Marks: 60**

SECTION A

I Write any Five of the following (Short Questions) **5 X 3 = 15 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 any of the three unit
8. A Question from any of the three unit

SECTION B

II Essay Questions. Answer all the Questions **3 X 15 = 45 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

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DEPARTMENT OF CHEMISTRY
B.SC III YR CHEMISTRY
SEMESTER VI
PAPER-VIII
LABORATORY COURSE:

CODE: BS:608P
HPW: 2

Credits:1
Total:30hrs

EXPERIMENTS IN PHYSICAL CHEMISTRY-II

1. Kinetics

a) Determination of specific reaction rate constant for the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
b) Determination of rate constant for the decomposition of hydrogen peroxide catalyzed by $FeCl_3$.

2. Electrochemistry
A. Potentiometry:

a) Estimation of Fe^{2+} by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.
b) Precipitation titration of KCl vs. $AgNO_3$ -Determination of given concentration of silver nitrate.

B. pH metry:

a) pH metric titration of strong acid (HCl) vs. strong base- Determination of the concentration of the given acid.
b) pH metric titration of weak acid(acetic acid) with strong base(NaOH).- Determination of acid dissociation constant (K_a) of weak acid.

3. Conductometry:

a) Determination of overall order: Saponification of ethyl acetate with NaOH by conductance measurements.

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DEPARTMENT OF CHEMISTRY
B.SC III YEAR SEMESTER – VI
CHEMISTRY – PAPER – VIII
EXPERIMENT IN PHYSICAL CHEMISTRY -II

PRACTICAL QUESTION PAPER PATTERN

Time: 2 hrs **Max. Marks 50**

1. Write the principle and procedure of the given experiment 10 M

2. Carryout the given experiment with minimum ten experimental readings , proper tabulation calculation and graph. 30 M

3 .Record and Viva 10 M

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DEPARTMENT OF CHEMISTRY
B.SC CHEMISTRY III YEAR
SEMESTER – VI
PAPER – VII AND VIII

INTERNAL EXAMINATION MODEL PAPER

Time – 30Min **Total Marks: 15M**

Multiple choice type: **10x ½ =5M**

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II Fill in the Blanks **10x ½ =5M**

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III Define the following **5X1=5M**

21 22 23 24 25

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