Study & Evaluation Scheme

of

Bachelor of Science (Hons.)
(Chemistry)
[Applicable for Academic Session 2017-18]
[Approved by Hon’ble VC dated August 08, 2017]
Programme : B.Sc. (Hons.) – Chemistry
Duration : Three-year full time (Six Semesters)
Medium : English
Minimum Required Attendance : 75%
Credit : Maximum Credit : 145
Minimum credit required for the degree : 133

(Minimum One non-core paper can be audit per year of program)

Assessment :

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Duration of Examination :

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<td>3 hrs.</td>
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(To qualify the course a student is required to secure a minimum of 45% marks in aggregate in each course including the semester-end examination and the teacher’s continuous evaluation shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 45% marks in a course, shall be deemed to have failed in that course.)

Question Paper Structure

1. The question paper shall consist of six questions. All six are compulsory. First question shall be of short answer type (not exceeding 50 words). Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).

2. Remaining five questions will be one from each unit with internal choice. The student has to answer one of the two in each question. The weightage of Question No. 2 to 6 shall be 10 marks each.

3. Usually each question in the examination should be designed to have a numerical component, where part of syllabus.
Note 1:

Evaluation Scheme for MOOC, Short Term Courses:

University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind the Academic Council in its 10th meeting on February 13, 2016, approved the University proposal and allowed a maximum of two credits to be allocated for MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through edX, Coursera, IIRS and NPTEL could be given a maximum credit of two with 1 credit for credit with 30-60 contact hours and 2 credits for courses having more than 60 credit hours.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

1. There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.

2. The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalise a list of courses to be offered with credits defined for each course and the mode of credit consideration of the student. The complete process including the approval of the Vice Chancellor shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course the approval will be valid only for the semester on offer.

3. A student can opt for a maximum of two MOOC courses for credit during the complete duration of the course other than offered under SWAYAM.

4. College can offer upto 20% credit through courses offered by SWAYAM. However, if the college is offering courses on other MOOC platforms, the total credit offered under MOOC will not exceed 20% including those offered under SWAYAM.

5. Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.
6. Where the MOOC course or Add-on on courses are only offering certificate of successful completion, and credit has been assigned to the course, the University examination division will conduct a MCQ examination for the course with 50 MCQ with 100 marks to facilitate inclusion of the courses in CPI computation.

7. College will define whether the credits are regular credits or to be considered only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.

8. In case the College wants the additional course to be shown in the mark sheet as additional course completed by the students the same shall also be mentioned by the College and the student will opt for the same at the time of taking admission to the course.
### Study & Evaluation Scheme
#### Semester I

<table>
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<tr>
<th>S. No.</th>
<th>Category (Core &amp; Non-core)</th>
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<th>Subject</th>
<th>Periods</th>
<th>Credit</th>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18
## Semester V

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Semester-I
Inorganic Chemistry-I

Course Code: BAS111  
L T P C  
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Objective:
The students are able to learn about atomic theories, periodicity of elements & chemical bonding.

Course Outcomes:
The students are able to understand the basic concept of atomic structure given by Bohr's theory. The student learns about basic principles for filling atomic orbitals. Periodicity of elements have been studied with special reference to effective nuclear charge, screening effects & calculation of Shielding constant has been done using Slater rule.

UNIT I  
(Lectures 08)
Atomic Structure:
Schrödinger’s wave equation, significance of $\psi$ and $\psi^2$. Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals.
Pauli’s Exclusion Principle, Hund’s rule of maximum multiplicity, Aufbau’s principle and its limitations.

UNIT II  
(Lectures 08)
Periodicity of Elements:
Effective nuclear charge, shielding or screening effect, Atomic & ionic radii, Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy, Electron gain enthalpy, Electronegativity, trends in periodic table and applications in predicting and explaining the chemical behavior.

UNIT III  
(Lectures 08)
Chemical Bonding - I:
Covalent bond: Valence Bond theory & its limitations. Hybridization & shapes of simple inorganic molecules & ions, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, Resonance and resonance energy, Molecular orbital theory & MO diagrams of Homo & heteronuclear (CO, NO) diatomic molecules.

UNIT IV  
(Lectures 08)
Chemical Bonding - II:
Ionic Solids: Covalent character in ionic compounds, polarizing power and polarizability. Fajan’s rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice energy and Born-Haber cycle, salvation energy and solubility of ionic solid.
UNIT V
(Lectures 08)
Metallic bond-free electron, Semiconductors & insulators, valence bond and band theories
Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions,
induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive
forces, Hydrogen bonding, Effects of chemical force, melting and boiling points, solubility
& energetics of dissolution process.
**Oxidation-Reduction:** Redox equations, Standard Electrode Potential and its application
to inorganic reactions.

**Text & Reference Books:**
1. Lee, J.D. Concise Inorganic Chemistry ELBS.

* Latest editions of all the suggested books are recommended*
Semester-I  
Physical Chemistry-I

Course Code: BAS112

L T P C
4 0 0 4

Objective: Gaseous state has been studied taking ideal gas equation & modification of the ideal gas equation. Liquefaction of gases and critical temp, pressure & volumes enhances the interest of the student.

Course Outcomes: 
The student will able to find out a detailed knowledge of applicability of different states of matter in our day to day life. Explanation of the phenomenon of liquefaction of gases will be easier.

Course Contents:
Unit I  
Gaseous state:  
(Lectures 08)
Postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path, including their temperature and pressure dependence. Behavior of real gases: Deviations from ideal gas behavior, compressibility factor, Z, Causes of deviation from ideal behavior. Vander Waals equation of state, its derivation and application in explaining real gas behavior, virial equation of state; van der Waals equation expressed in virial form and calculation of Boyle temperature.

Unit II  
Liquid state:  
(Lectures 08)
Qualitative treatment of the structure of the liquid state; Radial distribution function; physical properties of liquids; vapor pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases.

Unit III  
Solid state:  
(Lectures 08)
Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; Bragg’s law, Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Unit IV  
Ionic equilibria I:  
(Lectures 08)
Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di-and trip protic acids (exact treatment).

Unit V  
Ionic equilibria II:  
(Lectures 08)
Salt hydrolysis—calculation of hydrolysis constant, degree of hydrolysis and pH for different
salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers.
Solubility and solubility product of sparingly soluble salts – applications of solubility product principle
Theory of acid–base indicators; selection of indicators and their limitations.

Text & Reference Books:

- Castellan, G. W. Physical Chemistry, Narosa.
- Mortimer, R. G. Physical Chemistry, Elsevier:

* Latest editions of all the suggested books are recommended
Semester-I
Elementary Mathematics

Course Code: BAS113

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<td>3</td>
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</table>

Course Contents:

Unit – I

Unit – II

Unit – III

Unit – IV
Matrix: Definition of matrix, type of matrix, addition & subtraction, Multiplication, inverse of matrix. Solution of system of algebraic equation, Crammer’s rule.

Unit – V
Vector Calculus: Representation of vectors, Vector addition, multiplication & properties, Triple vector products.

Text & Reference Books:

* Latest editions of all the suggested books are recommended
Semester-I
Mechanics

Course Code: BAS114/BAS213                      L   T   P   C
                                                   4  0  0  4

Objective: To understand the fundamentals of physics like Linear Momentum, Rotational Dynamics, Motion under Central Forces, Properties of Matter etc.

Course Outcomes: The student will be able:
- To compute basic quantities in linear and rotational mechanics
- To formulate, analyze and solve a multi-level problem in mechanics.
- To apply mathematical tools to mechanics

Course Contents:

Unit – I  (Lectures 08)

Unit – II  (Lectures 08)

Unit – III  (Lectures 08)
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

Unit – IV  (Lectures 08)

Unit – V  (Lectures 08)
Text & Reference Books:


* Latest editions of all the suggested books are recommended
Semester I
English Communication and Soft Skills – I

Course Code: BHM199/EHM199
L   T  P  C
1   1   2   2

Objectives:
1. To remove the phobia of conversing in English.
2. To make the learners enable to express themselves among peers & teachers.
3. To enable learners, improve their vocabulary.
4. To introduce them with basic communicative skills in real life situations

Course Outcomes: At the end of the semester, the learner will be able to
1. Remove fear of speaking in English among peers & teachers.
2. Develop the ability to speak in English (even if grammatically not perfect).
3. Use vocabulary taught for speaking and writing simple sentence for day to day conversation.
4. Use taught vocabulary for writing applications on common issues.

Course Contents:

Unit – I Fear of Failure, Reasons of Fear of Failure & How to overcome it (12 hours)
- Self-Introduction
- Identifying strengths and weakness
- Fear of Failure: Signs of Fear of Failure, Reasons of Fear of Failure, Strategies to overcome Fear of Failure
- Positive Attitude
- Motivation
- Building Self Confidence

Unit – II Confidence, Presentability, Etiquettes & Manners (10 hours)
- Body Language: Facial Expression, Eye Contact, Gesture, Posture, Tips to have appropriate body language
- Grooming & Dressing Sense
- Etiquette & Manners: Social Etiquettes, Telephonic Etiquettes, Dining Etiquettes, Etiquettes to handle cultural differences, Etiquettes of Effective Conversation.
- Problem Sounds (s-sh,j-z,v-b)

Unit – III Conversation Practice, commonly made mistake & Initiating a conversation (10 hours)
- Vocabulary of commonly used words (50 Words)
- Conversation Practice: At College, At Bank, At Ticket Counter (Railway Station & Movie Theatre)
- How to initiate a conversation
- Commonly made mistakes in conversation
- Basic of Communication: 7Cs of Communication

Unit – IV Application writing (08 hours)
- Format & Style of Application Writing
- Practice of Application writing on common issues.
Reference Books:
- Harris, Thomas. A. “I am ok, You are ok” New York: Harper and Row.

Methodology:
1. Language Lab software.
2. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
3. Conversational Practice will be effectively carried out by Face to Face & Via Media (Telephone, Audio-Video Clips)
4. Modern Teaching tools (PPT Presentation, Tongue-Twisters & Motivational videos with sub-titles) will be utilized.

Note:
- 2 words per class will be taught with meaning, usage & correct pronunciation to ensure progressive learning.
- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

<table>
<thead>
<tr>
<th>Internal Evaluation</th>
<th>External Evaluation</th>
<th>Total Marks</th>
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<tbody>
<tr>
<td>50 Marks</td>
<td>50 Marks</td>
<td>100</td>
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<tr>
<td>40 Marks (Progressive Evaluation)</td>
<td>25 Marks Midway external assessment (Viva)*</td>
<td>25 Marks (External Viva)**</td>
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<tr>
<td>After each unit-completion: Assignments / oral Presentation</td>
<td>10 Marks (Attendance)</td>
<td>25 Marks</td>
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</tbody>
</table>

Note: Midway external assessment of 25 marks will be submitted and considered with external evaluation with a total of 50 marks.

*Parameters of Midway external assessment (Viva)*

<table>
<thead>
<tr>
<th>Content</th>
<th>Dressing sense &amp; Grooming</th>
<th>Confidence</th>
<th>Pronunciation</th>
<th>Question responsiveness</th>
<th>TOTAL</th>
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<tr>
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<td>25 Marks</td>
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</table>

Note: To take corrective actions, midway assessment will be conducted by 2-member committee of Director’s nominee (not by the faculty teaching English courses) and average of the two would be the 25 marks obtained by the students after two units are completed.
**Parameters of External Viva**

<table>
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<tr>
<th>Content</th>
<th>Dressing sense &amp; Grooming</th>
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</table>

**Note:** External Viva will be conducted by 3-member committee comprising

a) Faculty teaching the class
b) English faculty from other college of the University (As approved by VC).
c) T&P officer of other colleges of the University (As approved by VC).

Each member will evaluate on a scale of 25 marks and the average of three would be the 25 marks obtained by the students.
Semester-I
Inorganic Chemistry-I (Lab)

Course Code: BAS164
L T P C
0 0 3 2

Objective:
The course content consists of volumetric analysis of acid base titration & oxidation-reduction titration.

Course Outcomes: The Practical Knowledge provide skills to the student to determine the strength of unknown solution by acid base titration as well as by oxidation reduction titration.

(A) Titrimetric Analysis
1. Calibration and use of apparatus
2. Preparation of solutions of different Molarity/Normality of titrants

(B) Acid-Base Titrations
3. Estimation of carbonate and hydroxide present together in mixture.
4. Estimation of carbonate and bicarbonate present together in a mixture.
5. Estimation of free alkali present in different soaps/detergents

(c) Oxidation-Reduction Titrimetry
6. Estimation of Fe(II) and oxalic acid using standardized KMnO₄ solution.
7. Estimation of oxalic acid and sodium oxalate in a given mixture.
8. Estimation of Fe(II) with K₂Cr₂O₇ using internal (diphenylamine, anthranilic acid) and external indicator.

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

<table>
<thead>
<tr>
<th>Evaluation scheme:</th>
<th>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEMESTER (35 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
<th>TOTAL INTERNAL (50 MARKS)</th>
</tr>
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<tbody>
<tr>
<td>EXPERIMENT (5 MARKS)</td>
<td>FILE WORK (10 MARKS)</td>
<td>VIVA (10 MARKS)</td>
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</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

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<tr>
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</table>
Semester-I
Physical Chemistry-I (Lab)

Course Code: BAS165
L T P C
0 0 3 2

Objective:
This Lab includes experiments based on determination of viscosity, Surface tension & pH
determination of solute & solvents.

Course Outcome:
The students will be able to find out the principle involved behind the determination of
surface tension, viscosity, partition coefficients of Iodine using carbon tetrachloride &
water, adsorption of acetic acid on charcoal, integral enthalpy of copper sulphate solution,
rate constant for ester hydrolysis & sugar, kinetics of acetone- Iodine reaction, Iodine
hydrogen peroxide neutralization reaction between acid & bases.

(A) Surface tension measurements.
1. Determine the surface tension by (i) drop number (ii) drop weight method.

(B) Viscosity measurement using Ostwald’s viscometer.
2. Determination of viscosity of aqueous solutions of (i) ethanol and (ii) sugar at room
temperature.
3. Study the variation of viscosity of sucrose solution with the concentration of solute.

(C) pH metry
4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium
acetate and their mixtures.
5. Preparation of buffer solutions of different pH
   - Sodium acetate-acetic acid
   - Ammonium chloride-ammonium hydroxide
6. pH metric titration of
   - strong acid vs. strong base,
   - weak acid vs. strong base.

Text & Reference Books:
1. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand
   & Co.: New Delhi.
   & Co.: New York.
   * Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

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**External Evaluation (50 marks)**

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Semester-I
Mechanics (Lab)

Course Code: BAS166/BAS267

List of Experiments:

Note: Select any ten experiments from the following list.

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To study the random error in observations.
3. To determine the height of a building using a Sextant.
4. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
5. To determine the Moment of Inertia of a Flywheel.
6. To determine g and velocity for a freely falling body using Digital Timing Technique.
8. To determine the Young's Modulus of a Wire by Optical Lever Method.
9. To determine the Modulus of Rigidity of a Wire by Maxwell’s needle.
10. To determine the elastic Constants of a wire by Searle’s method.
11. To determine the value of g using Bar Pendulum.
12. To determine the value of g using Kater’s Pendulum.

Text & Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, Kitab Mahal.
4. Engineering Practical Physics, S. Panigrahi & B. Mallick, Cengage Learning India Pvt. Ltd.

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.
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External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

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Semester I
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP111

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IIInd & IIIrd CT in semester:

<table>
<thead>
<tr>
<th>S No</th>
<th>Enroll No.</th>
<th>Student Name</th>
<th>Dress code</th>
<th>Participation in Conferences /Workshops / Seminars</th>
<th>Participation in guest lectures, invited talks and special technical sessions</th>
<th>Participation in community Services</th>
<th>Participation in Culture &amp; extra curriculum activities, Department Club Activities</th>
<th>Participation in sports/ co-curricular activities</th>
<th>General Behavior</th>
<th>Any Extra Achievement</th>
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<td>Responsible for marks</td>
<td>Mentor</td>
<td>Head</td>
<td>Head</td>
<td>Mentor</td>
<td>Cultural Events Coordinator &amp; Department Club Coordinator</td>
<td>Sports Coordinator</td>
<td>Mentor</td>
<td>Director or Principal</td>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18 Page 25
Semester-II  
Organic Chemistry-I

Course Code: BAS211  
L T P C  4 0 0 4

Objective:
It consists of preparation, properties & structure & mechanism of haloalkanes, alcohols, phenols, ether, and epoxides. The name reactions have been taught to the students to clear the concept of reaction mechanism. Carbonyl compounds are of great interest as they show zero oxidation states of metal. Mechanism of named reactions for examples Perkin, canizzaro has been studied. Carboxylic acid & their derivatives have been prepared.

Course Outcome:
Nucleophilic substitution reactions & their mechanism is of great interest for the students. The preparation of organometallic compounds & its uses gives many new syntheses. Acidic character of phenol & different named reactions has been explained to the students. Ether, epoxides, carbonyl compounds & carboxylic acids have been studied in details with their physical & chemical properties.

Course Contents:

Unit – I (08 Lectures)
Basics of Organic Chemistry I:
Electronic Displacements: Inductive, electrometric, resonance and mesmeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.

Unit – II (08 Lectures)
Basics of Organic Chemistry II:
Hemolytic and Heterolytic fission. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes.
Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.
Unit – III
Chemistry of Carbon-Carbon pi bonds:
Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.
Reactions of alkenes: Electrophilic additions their mechanisms (Markownik off/ Anti-Markownik off addition), hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic brominating and mechanism, e.g. propene, 1-butene.
Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Unit – IV
Stereochemistry:

Unit – V
Aromatic Hydrocarbons:
Aromaticity: Hückel’s rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft’s alkylation/acylation with their mechanism. Directing effects of the groups.

Text & Text & Text & Reference Books:
3. Finar, I. L. Organic Chemistry (Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
* Latest editions of all the suggested books are recommended
Objective:
This includes all the fundamental concepts related with the chemical thermodynamics along with its applications in various areas.

Course Outcome:
The students will be able to find out a detailed knowledge about isolated, closed, open systems. The concept of heat, work, internal energy & calculation of entropic changes for reversible & irreversible process. Application of Gibb's & Helmholtz equations & its impact on temperature, volume & pressure. The physical & chemical equilibria & application of Le Chatelier principles proved fruitful results in production of ammonia. They will also be able to determine the molecular masses of ionic & organic compounds by using colligative properties

Course Contents:

Unit-I (8 Lectures)
Chemical Thermodynamics-I:
Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.
First law: Concept of heat, q, work, w, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

Unit-II (8 Lectures)
Chemical Thermodynamics-II:
Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; Calculation of entropy change for reversible and irreversible processes.
Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.
Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules

Unit-III (8 Lectures)
Thermochemistry and Systems of Variable Composition:
Thermochemistry: Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy, effect of temperature (Kirchhoff’s equations) and pressure on enthalpy of reactions.
Partial molar quantities, Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

**Unit-IV**  
**Chemical Equilibrium:**  
(8 Lectures)
Criteria of thermodynamic equilibrium, chemical equilibria in ideal gases. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants Kp, Kc and Kx. Le Chatelier principle.

**Unit-V**  
**Solutions and Colligative Properties:**  
(8 Lectures)
Dilute solutions; lowering of vapour pressure, Raoult’s and Henry’s Laws and their applications. Excess thermodynamic functions. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure].

**Text & Reference Books:**


*Latest editions of all the suggested books are recommended*
Semester-II  
Waves & optics

Course Code: BAS220  
L T P C  
4 0 0 4

Objective: To understand the fundamentals of physics like geometrical optics & wave motion, electromagnetic theory, wave optics: diffraction, interferometer and holography etc.

Course Outcomes: After completion of the course, student will be able to -
1. get the idea of geometrical optics including the wave motion
2. provide basic and advanced concept of holography, interference and diffraction.

Course Contents:

Unit-I (8 Lectures)
Geometrical optics: Fermat’s principle, reflection and refraction at plane interface, Application to thick lenses, Ramsden and Huygens eyepiece.

Unit-II (8 Lectures)
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical methods. Lissajous Figures (1:1 and 1:2) and their uses. Superposition of N harmonic waves.

Unit-III (8 Lectures)

Unit-IV (8 Lectures)

Unit-V (8 Lectures)
Fresnel Diffraction: Fresnel’s Assumptions. Fresnel’s Half-Period Zones for Plane Wave, Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel’s Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire.
Text & Reference Books:


* Latest editions of all the suggested books are recommended
Semester II
Environmental Studies

Course Code: BAS214/EAS115/BAS328/BAS428  L  T  P  C
1  2  0  2

Objective: To create awareness among students about environment protection.

Course Outcomes:
Based on this course, the Engineering graduate will understand / evaluate / develop
technologies on the basis of ecological principles and environmental regulations which in
turn helps in sustainable development.

Course Content:
Unit I
Definition and Scope of environmental studies, multidisciplinary nature of environmental studies,
Concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem- its structure and functions, Energy Flow
in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of
following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert
Ecosystem.

Unit II
Natural Resources: Renewable & Non-Renewable resources; Land
resources and landuse change; Land degradation, Soil erosion & desertification. Deforestation:
Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. Energy
Resources: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy
sources, Case studies.

Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and
Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India

Unit III
Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution,
Nuclear hazards & human health risks, Solid waste Management; Control measures of urban &
industrial wastes, pollution case studies

Unit IV
Environmental policies & practices: Climate change & Global
Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, Photochemical Smog, Acid Rain
Environmental laws: Environment protection Act; air prevention & control of pollution act, Water
Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts,
International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature
reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit V
Human Communities & Environment:
Human population growth; impacts on environment, human health & welfare, Resettlement &
rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods
& Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley,
Vishnoi’s of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in
environmental conservation, Environmental communication & public awareness; Case study
Field Work:
1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Text Books:

Reference Books:
1. “Biodiversity and Conservation”, Bryant, P. J., Hypertext Book

*Latest editions of all the suggested books are recommended.*
Semester II
English Communication and Soft Skills-II

Course Code: BHM249/ EHM249

L   T   P   C
1   1   2   2

Objectives:
1. To enhance the vocabulary of learners to address competitive exams like PGT & TGT.
2. To develop ability of sentence construction.
3. To enhance learner’s writing ability.
4. To make the learner effective in presenting himself/herself.

Course Outcomes: At the end of the semester, the learner will be able to
1. Learn additional 100 words apart from 50 words learnt in preceding semester (3 words/lecture).
2. Write letters effectively.
3. Acquire competence in constructing short sentences dealing day to day activities with grammatical accuracy.
4. Express themselves before class/in a group and attain proficiency in deliverance.
5. Acquire adequate knowledge of grammar to address competitive exams like PGT & TGT.

Course Contents:

Unit – I Vocabulary & Grammar (14 hours)
- Homophones, Homonyms, Synonyms, Antonyms and one-word substitution.
- Parts of Speech, Modals, Tenses and Simple sentence construction.

Unit – II Listening Skills (05 hours)
- Difference between listening & hearing, Types of Listening, Process
- Importance and Barriers to listening

Unit – III Writing Skills (08 hours)
- Letters and Email writing
- Story Narration

Unit – IV Strategies & Structure of Presentation and Problem Sounds (13 hours)
- Managing Time, Audience & Locale, Structure and Organization of Content and 5 W’s
- Problem Sounds: S-Sh, J-Z and V-B*

Reference Books:
Methodologies:
1. Words and exercises, usage in sentences.
2. Sentence construction on daily activities and conversations.
3. Format and layout to be taught with the help of samples and preparing letters on different subjects.
4. JAM sessions and Picture presentation.
5. Tongue twisters, Newspaper reading and short movies.

Note:
- 3 words per class will be taught with meaning, usage & correct pronunciation to ensure progressive learning.
- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.
- Repeated practice of sound.

Evaluation Scheme

<table>
<thead>
<tr>
<th>Internal Evaluation</th>
<th>External Evaluation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Marks</td>
<td>60 Marks</td>
<td>100</td>
</tr>
<tr>
<td>30 Marks (Progressive Evaluation)</td>
<td>20 Marks Midway external assessment (Oral Presentation) *</td>
<td>40 Marks (Written Examination)</td>
</tr>
<tr>
<td>After each unit-completion: Assignments / oral Presentation</td>
<td>10 Marks (Attendance)</td>
<td></td>
</tr>
</tbody>
</table>

* Parameters of Midway external assessment Oral Presentation

<table>
<thead>
<tr>
<th>Content</th>
<th>Pronunciation</th>
<th>Delivery of Content</th>
<th>Question responsiveness</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 Marks</td>
<td>05 Marks</td>
<td>05 Marks</td>
<td>05 Marks</td>
<td>20 Marks</td>
</tr>
</tbody>
</table>

Note:
Midway Assessment: To take corrective actions, midway assessment will be conducted by 2-member committee of Director’s nominee (not by the faculty teaching English courses) and average of the two would be the 20 marks obtained by the students after two units are completed. The marks in sealed envelope will be send to Examination Department.

Written Examination: There would be four questions with internal choice one from each unit of 10 marks.
Semester-I
Organic Chemistry-I (Lab)

Course Code: BAS264
L T P C
0 0 3 2

Objective: The course content is of great interest to learn about purification of compounds by crystallization, determination of melting point & chromatographic separation of organic compounds.

Course Outcome:
These students will be able to learn about purification methods & separation of different components by chromatography

List of Experiments:
1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:
   a. Water
   b. Alcohol
   c. Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Electrically heated melting point apparatus)
4. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds
5. Chromatography
   a. Separation of a mixture of two ink mixture by paper chromatography
   b. Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC)

Text & Reference Books:

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<thead>
<tr>
<th>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEMESTER (35 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
<th>TOTAL INTERNAL (50 MARKS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENT (5 MARKS)</td>
<td>FILE WORK (10 MARKS)</td>
<td>VIVA (10 MARKS)</td>
</tr>
</tbody>
</table>
External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

<table>
<thead>
<tr>
<th>EXPERIMENT (20 MARKS)</th>
<th>FILE WORK (10 MARKS)</th>
<th>VIVA (20 MARKS)</th>
<th>TOTAL EXTERNAL (50 MARKS)</th>
</tr>
</thead>
</table>


Semester-I
Physical Chemistry-II (Lab)

Course Code: BAS265

Objective:
This syllabus consists of determination of heat capacity, calculation of enthalpy of ionization, enthalpy of hydration & solubility of benzoic acid in water has been studied.

Course Outcome:
After performing this lab course students will be able to perform all the basic experiments on Thermo chemistry including heat capacity and solubility.

List of Experiments:
Thermochemistry

1. Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
2. Calculation of the enthalpy of ionization of ethanoic acid.
3. Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.
4. Determination of enthalpy of hydration of copper sulphate.
5. Study of the solubility of benzoic acid in water and determination of $\Delta H$.

Text & Reference Books:


* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<thead>
<tr>
<th>EXPERIMENT (5 MARKS)</th>
<th>VIVA (10 MARKS)</th>
<th>ATTENDANCE (10 MARKS)</th>
<th>EXPERIMENT (5 MARKS)</th>
<th>VIVA (10 MARKS)</th>
<th>TOTAL INTERNAL (50 MARKS)</th>
</tr>
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<tbody>
<tr>
<td>ON THE DAY OF EXAM (15 MARKS)</td>
<td>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEMESTER (35 MARKS)</td>
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</tbody>
</table>

B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18
**External Evaluation (50 marks)**

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

<table>
<thead>
<tr>
<th>EXPERIMENT (20 MARKS)</th>
<th>FILE WORK (10 MARKS)</th>
<th>VIVA (20 MARKS)</th>
<th>TOTAL EXTERNAL (50 MARKS)</th>
</tr>
</thead>
</table>

Semester-II
Waves & Optics (Lab)

Course Code: BAS266

L  T  P  C
0  0  3  2

Objective: To compute practically the various types of optical properties, study of various interference patterns, determination of refractive index and measurement of dispersive power of grating.

Course Outcomes: After completion of the lab course, student will be able to understand
1. The optical properties with their use
2. Schuster’s focusing
3. The various interference patterns

List of Experiments:
Note: Select any ten experiments from the following list.

1. To determine the frequency of an electric tuning fork by Melde’s experiment and verify $\lambda^2 - T$ law.
2. To investigate the motion of coupled oscillators.
3. To study Lissajous Figures.
4. Familiarization with: Schuster’s focusing; determination of angle of prism.
5. To determine refractive index of the material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. To determine the wavelength of sodium source using Michelson’s interferometer.
8. To determine wavelength of sodium light using Fresnel Bi-prism.
10. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped film.
11. To determine wavelength of (1) Na source or (2) spectral lines of Hg source using plane diffraction grating.
12. To determine dispersive power and resolving power of a plane diffraction grating.

Reference Books
1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash & Ramakrishna, Kitab Mahal.
3. Advanced level Physics Practical, Michael Nelson and Jon M. Ogborn, Heinemann Educational Publishers
Evaluation Scheme of Practical Examination:

**Internal Evaluation (50 marks)**
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

**Evaluation scheme:**

<table>
<thead>
<tr>
<th>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEASON (35 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
<th>TOTAL INTERNAL (50 MARKS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENT (5 MARKS)</td>
<td>FILE WORK (10 MARKS)</td>
<td>VIVA (10 MARKS)</td>
</tr>
</tbody>
</table>

**External Evaluation (50 marks)**

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

| EXPERIMENT (20 MARKS) | FILE WORK (10 MARKS) | VIVA (20 MARKS) | TOTAL EXTERNAL (50 MARKS) |
Semester II
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP211

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/co-curricular activities) organized at College / University and other level.
8. General behavior

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IIInd & IIIrd CT in semester:

<table>
<thead>
<tr>
<th>S No</th>
<th>Enroll No.</th>
<th>Student Name</th>
<th>Dress code</th>
<th>Participation in Conferences /Workshops / Seminars</th>
<th>Participation in guest lectures, invited talks and special technical sessions</th>
<th>Participation in community Services</th>
<th>Participation in Culture &amp; extra curriculum activities, Department Club Activities</th>
<th>General Behavior</th>
<th>Any Extra Achievement</th>
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<td></td>
<td></td>
<td>Mentor</td>
<td>Head</td>
<td>Head</td>
<td>Mentor</td>
<td>Cultural Events Coordinator &amp; Department Club Coordinator</td>
<td>Sports Coordinator</td>
<td>Mentor</td>
<td>Director or Principal</td>
</tr>
</tbody>
</table>

B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18
B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18

Semester-III
Inorganic Chemistry-II

Course Code: BAS311
L T P C
4 0 0 4

Objective:
The syllabus consists of chemistry of S& P block elements along with the specific properties like inert pair effect etc. This part of the syllabus also contains the preparation, properties, structure & uses of some important inorganic compounds like boric acid, interhalogen compounds etc. The chemistry of 18 group elements and their compound formation by noble gases. Inorganic polymers their synthesis & application are of great importance.

Course Outcome:
S & P block elements are taught to the student along with their physical & chemical properties. They are highly reactive & show special chemical properties. P block elements show anomalous properties like allotropy, catenation and complex formation. The inorganic compounds boric acid, borohydrides, interhalogen compounds have been taught with special reference to their preparation, properties, structure & uses. Formation of noble gas compound is of great interest to the student & structures have been explained by VSEPR theory. Inorganic polymers were introduced to the student & comparison was made between organic & inorganic polymers.

Course Contents:

Unit-I (08 Lectures)


Unit- II (08 Lectures)

Chemistry of s and p Block Elements I: Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behavior of first member of each group. Allotropy and catenation. Complex formation tendency of s and p block elements. Hydrides and their classification ionic, covalent and interstitial.

Unit – III (08 Lectures)

Chemistry of s and p Block Elements II: Structure, bonding, preparation, properties and uses of Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes and graphitic compounds, silanes, Oxides and o xoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds, polyhalide ions, pseudohalogenes and basic properties of halogens.

Unit – IV (08 Lectures)

Noble Gases: Occurrence and uses, rationalization of inertness of noble gases, Clathrates; preparation and properties of XeF2, XeF4 and XeF6; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF2). Molecular shapes of noble gas compounds (VSEPR theory).
Unit – V

Inorganic Polymers:  

(08 Lectures)

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes, and polysulphates.

Text & Reference Books:

1. Lee, J. D. Concise Inorganic Chemistry, ELBS.

* Latest editions of all the suggested books are recommended
Semester-III
Organic Chemistry-II

Course Code: BAS312
L T P C
4 0 0 4

Objective:

• To give a basic idea to students regarding nomenclature, synthesis & structure of Aromatic Nitro Compounds, Poly-nuclear aromatic Hydrocarbons, Heterocyclic aromatic Hydrocarbons & Alkaloids.

• To teach students regarding the preparation of derivatives of few compounds of above mentioned group.

Course Outcome:

• By detailed study of this paper students will be able to tell the structure & nomenclature & chemical reactivity of above mentioned aromatic compounds.

• Students will gather enough knowledge regarding preparation of derivatives of different types of aromatic compounds

Course Contents:

Unit – I
Chemistry of Halogenated Hydrocarbons: (08 Lectures)
Alkyl halides: Methods of preparation, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.
Aryl halides: Preparation, including preparation from diazonium salts. nucleophilic aromatic substitution; SNAr, Benzyne mechanism.
Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

Unit – II
Alcohols, Phenols, Ethers and Epoxides: (08 Lectures)
Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement;
Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe’s–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;

Unit – III
Ethers and Epoxides& Sulphur containing compounds: (08 Lectures)
Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and LiAlH4
Sulphur containing compounds: Preparation and reactions of thiols, thioethers and sulphone acids.
Unit – IV  
**Carbonyl Compounds:**  
(08 Lectures)  
Structure, reactivity and preparation; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzenic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, oxidations and reductions (Clemmensen, Wolff-Kishner, LiAlH4, NaBH4.)

Unit – V  
**Carboxylic Acids and their Derivatives:**  
(08 Lectures)  
Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acids; Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters.

**Text & Reference Books:**


*Latest editions of all the suggested books are recommended*
Semester-III
Physical Chemistry-III

Course Code: BAS313  
L   T   P   C  
4    0    0    4

Objective:
This consists of concept of phases & application of Clausius-clapeyron equation & its 
application to solid-liquid, liquid-vapor & solid-vapor equilibria. Nernst Distribution laws 
has been applied in the determination of degree of dissociation, association & complex ion 
formation. Electrochemistry is of great importance in industry for the formation of chemical 
cells & their applications have been highlighted in our daily life as well as in industry. 
Arrhenius theory of electrolytic dissociation has been discussed. A difference between week 
& strong electrolyte has been highlighted for better understanding of students.

Course Outcomes:
Students will be aware of the components & degree of freedom & its application. A clear 
concept of different phase diagrams, congruent & non-congruent melting points of the solid 
solutions will be observed. The determination of degree of dissociation & complex ion 
formation by using Nerst equation will be clear. The applications of electrochemistry are of 
great use for the students. Molar conductivity at infinite dilution & Debye-Hucke-Onsagar 
equation will be easy to explain for students.

Course Contents:
Unit - I
Phase Equilibria I:
Concept of phases, components and degrees of freedom, Clausius-Clapeyron equation and its 
applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one 
component systems, with applications.
Three component systems, water-chloroform-acetic acid system, triangular plots.

Unit - II
Phase Equilibria II:
Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to 
fractional distillation of binary miscible liquids (ideal and nonideal), azeotropes, lever rule, 
partial miscibility of liquids, CST, miscible pairs, steam distillation. Nernst distribution law: 
its derivation and applications.

Unit – III
Chemical Kinetics I:
Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, 
differential and integrated form of rate expressions up to second order reactions, experimental 
methods of the determination of rate laws, kinetics of complex reactions (integrated rate 
expressions up to first order only): (i) Opposing reactions (ii) parallel reactions and (iii) 
consecutive reactions and their differential rate equations (steady-state approximation in 
reaction mechanisms) (iv) chain reactions.
Unit – IV

Chemical Kinetics II:
Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates, Lindemann mechanism, qualitative treatment of the theory of absolute reaction rates.

Unit – V

Catalysis and Surface chemistry:
Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces; Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis. Physical adsorption, chemisorption, adsorption isotherms. nature of adsorbed state.

Text & Reference Books:

1. Peter Atkins & Julio De Paula, Physical Chemistry, Oxford University Press.
2. Castellan, G. W. Physical Chemistry, Narosa.
5. Ball, D. W. Physical Chemistry Cengage India..

* Latest editions of all the suggested books are recommended
Semester-III
Elements of Modern Physics

Course Code: BAS314

Objective: To learn basics of modern Physics, Planck’s quantum and fundamental of quantum relations.

Course Outcomes: After completion of the course, student will be able to understand

- The basic laws of quantum and their relations etc.
- the Fission and fusion- Lasers
- The law of decay and stability of the nucleus, electron-positron pair creation etc.

Course Contents:

Unit-I (08 Lectures)
Planck’s quantum-I: Planck’s constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves. Two-Slit experiment with electrons.

Unit-II (08 Lectures)
Planck’s quantum-II: Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles

Unit-III (08 Lectures)
Schrodinger Equations: Schrodinger equations, Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force

Unit-IV (08 Lectures)
Fission and fusion: Mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Fusion and thermonuclear reactions driving stellar energy.

Unit-V (08 Lectures)
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli’s prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.

Reference Books:
2. Introduction to Quantum Mechanics, David J. Griffith, Pearson Education.
7. Six Ideas that Shaped Physics: Particle Behave like Waves, T. A. Moore, McGraw Hill.

* Latest editions of all the suggested books are recommended
Semester-III
English Communication and Soft Skills-III

Course Code: BHM349/EHM349/449
L  T  P  C
1  1  2  2

Objectives:
1. To enable the learners to upgrade their knowledge of grammar and vocabulary to address competitive exams like PGT & TGT.
2. To enable the learner to improve their listening.
3. To enable the learners to improvise their voice modulation in reading and speaking.
4. To enable the learners to enhance their writing and comprehensive skills in English.
5. To enable the learners to proactively participate in activities in situational context.

Course Outcomes: At the end of the semester, the learners will be able to
1. Refine their usage of English grammar in day to day context.
2. Acquire adequate knowledge of grammar to address competitive exams like PGT & TGT.
3. Use advance English language by using variety of words i.e. idioms and phrase in variety of sentences in functional context.
4. Improve their listening to understand the basic content.
5. Improvise their voice modulation while reading and speaking something.
6. Enhance writing and comprehensive skills in English.
7. Present simple power point presentation (PPT).
8. Proactively participate in activities in situational context (like impromptu).

Course Contents:

Unit – I Grammar & Vocabulary (14 hours)
- Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
- Synthesis of sentences: Simple, complex and compound Sentences
- Transformation of sentences
- Commonly used Idiom & Phrases (Progressive learning whole semester)

Unit – II Essence of Effective listening & speaking (12 hours)
- Listening short conversation/ recording (TED talks / Speeches by eminent personalities)
  Critical Review of these abovementioned
- Voice Modulation: Five P’s - Pace, Power, Pronunciation, Pause, and Pitch.
- Impromptu
- Power Point Presentation (PPT) Skills: Nuances of presenting PPTs

Unit – III Reading and Comprehension Skills (08 hours)
- Strategies of Reading comprehension: Four S’s
- How to solve a Comprehension (Short unseen passage: 150-200 words)
- Reading Newspaper (Progressive learning whole semester)
Unit – IV Writing Skills (06 hours)

- Essentials of a paragraph
- Paragraph writing (100-120 words)

Reference Books:

Note:
- For effective communication practice, groups will be changed weekly
- Class (above 30 students) will be divided in to two groups for effective teaching.

Evaluation Scheme

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<tr>
<th>Internal Evaluation</th>
<th>External Evaluation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Marks</td>
<td>60 Marks</td>
<td>100</td>
</tr>
<tr>
<td>30 Marks (Progressive Evaluation)</td>
<td>20 Marks Midway external assessment (Oral Presentation) *</td>
<td></td>
</tr>
<tr>
<td>After each unit-completion: Assignments / oral Presentation</td>
<td>Assignments / oral Presentation</td>
<td></td>
</tr>
<tr>
<td>10 Marks (Attendance)</td>
<td>10 Marks (Attendance)</td>
<td></td>
</tr>
</tbody>
</table>

* Parameters of Midway external assessment Oral Presentation

<table>
<thead>
<tr>
<th>Content</th>
<th>Pronunciation</th>
<th>Delivery of Content</th>
<th>Question responsiveness</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 Marks</td>
<td>05 Marks</td>
<td>05 Marks</td>
<td>05 Marks</td>
<td>20 Marks</td>
</tr>
</tbody>
</table>

Note:
Midway Assessment: To take corrective actions, midway assessment will be conducted by 2-member committee of Director’s nominee (not by the faculty teaching English courses) and average of the two would be the 20 marks obtained by the students after two units are completed. The marks in sealed envelope will be send to Examination Department.

Written Examination: There would be four questions with internal choice one from each unit of 10 marks.
Semester-III
Inorganic Chemistry-II (Lab)

Course Code: BAS361

Objective: The course content provides an idea to the student for the estimation & preparation of inorganic compounds in the laboratory.

Course Outcome:
This practical part of course will bring confidence among the student for the estimation of elements by iodometric titrations & preparation of inorganic compounds.

List of Experiments:
1. Estimation of Cu(II) and K2Cr2O7 using sodium thiosulphate solution (Iodimetrically).
2. Estimation of (i) arsenite and (ii) antimony in tartar-emetic iodimetrically.
3. Estimation of available chlorine in bleaching powder iodometrically.
4. Preparation of Manganese(III) phosphate, MnPO4.2H2O
5. Preparation of Aluminum potassium sulphate KAl(SO4)2.12H2O (Potash alum) or Chrome alum.

Text & Reference Books:

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<thead>
<tr>
<th>EXPERIMENT (5 MARKS)</th>
<th>FILE WORK (10 MARKS)</th>
<th>VIVA (10 MARKS)</th>
<th>ATTENDANCE (10 MARKS)</th>
<th>TOTAL INTERNAL (50 MARKS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON THE DAY OF EXAM (15 MARKS)</td>
<td>EXPERIMENT (5 MARKS)</td>
<td>VIVA (20 MARKS)</td>
<td>TOTAL EXTERNAL (50 MARKS)</td>
<td></td>
</tr>
</tbody>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.
Semester-III
Organic Chemistry-II (Lab)

Course Code: BAS362  L  T  P  C
0  0  3  2

**Objective:** The course contents provide an idea to identify the organic compounds of different functional groups & preparation of few organic compounds.

**Course Outcomes:** This is an interesting field of learning for the students reading to industrial level to develop extra knowledge in their practical work.

**List of Experiments:**
1. Functional group tests for alcohols, phenols, carbonyl and carboxylic acid group.
2. Organic preparations:
   i. Acetylation of one of the following compounds: amines (aniline, o-, m-, p-toluidines and o-, m-, p-anisidine) and phenols (β-naphthol, salicylic acid) by any one method:
      a. Using conventional method.
      b. Using green approach
   ii. Benzoylation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m, p-anisidine) and one of the following phenols (β-naphthol, resorcinol, p-cresol) by Schotten-Baumann reaction.
   iii. Nitration of any one of the following:
      a. Acetanilide/nitrobenzene by conventional method
      b. Salicylic acid by green approach (using ceric ammonium nitrate).
   iv. Selective reduction of meta dinitrobenzene to m-nitroaniline.
   v. Reduction of p-nitro benzaldehyde by sodium borohydride.
   vi. Hydrolysis of amides and esters.
   vii. Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.
   viii. Benzil-Benzilic acid rearrangement.

The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC.

**Text & Reference Books:**

*Latest editions of all the suggested books are recommended*
Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<thead>
<tr>
<th>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEMESTER (35 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENT (5 MARKS)</td>
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</tr>
</tbody>
</table>

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

<table>
<thead>
<tr>
<th>EXPERIMENT (20 MARKS)</th>
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</tr>
</thead>
</table>
Semester-III
Physical Chemistry-III (Lab)

Course Code: BAS363

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Objective: This lab is designed to study the equilibrium & potentiometric titrations using acids & bases, determination of critical solution temperature & composition of phenol-water system & impact of impurities on it.

Course Outcomes:
After performing these experiments, the students will be aware of the determination of equilibrium constant by distribution methods between iodine & iodide ion etc. They also get acknowledged with potentiometric titrations of strong and weak acids. The phenomenon behind critical temperature determination for phenol-water system will be more-clear.

List of Experiments:
1. Determination of critical solution temperature and composition of the phenol-water system and to study the effect of impurities on it.
2. Phase equilibria: Construction of the phase diagram using cooling curves or ignition tube method:
   a) simple eutectic and
   b) congruently melting systems.
3. Distribution of acetic/ benzoic acid between water and cyclohexane.
4. Study the equilibrium of at least one of the following reactions by the distribution method:
   i. \( \text{I}_2(\text{aq}) + \text{I}^- \rightarrow \text{I}_3(\text{aq})^{2+} \)
   ii. \( \text{Cu}^{2+}(\text{aq}) + n\text{NH}_3 \rightarrow \text{Cu(NH}_3)_n \)
5. Study the kinetics of the following reactions.
6. Initial rate method: Iodide-persulphate reaction
7. Integrated rate method:
   i. Acid hydrolysis of methyl acetate with hydrochloric acid.
   ii. Saponification of ethyl acetate.
8. Compare the strengths of HCl and H2SO4 by studying kinetics of hydrolysis of methyl acetate.
9. Adsorption

Text & Reference Books:

* Latest editions of all the suggested books are recommended
**Evaluation Scheme of Practical Examination:**

**Internal Evaluation (50 marks)**
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

**Evaluation scheme:**

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<tr>
<td></td>
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<td>VIVA (10 MARKS)</td>
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</tbody>
</table>

**External Evaluation (50 marks)**

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

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<th>EXPERIMENT (20 MARKS)</th>
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</tr>
</thead>
</table>


Semester III
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP311

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences / Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IIrd & IIIrd CT in semester:

<table>
<thead>
<tr>
<th>S No</th>
<th>Enroll No.</th>
<th>Student Name</th>
<th>Dress code</th>
<th>Participation in Conferences / Workshops / Seminars</th>
<th>Participation in guest lectures, invited talks and special technical sessions</th>
<th>Participation in community Services</th>
<th>Participation in Culture &amp; extra curriculum activities, Department Club Activities</th>
<th>General Behavior</th>
<th>Any Extra Achievement</th>
</tr>
</thead>
<tbody>
<tr>
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<td>(5)</td>
<td>(15)</td>
<td>(20)</td>
<td>(10)</td>
<td>(20)</td>
<td>(5)</td>
</tr>
</tbody>
</table>

Responsible for marks

| Mentor | Head | Head | Mentor | Cultural Events Coordinator & Department Club Coordinator | Sports Coordinator | Mentor | Director or Principal |

B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18
Semester-IV  
Inorganic Chemistry-III

Course Code: BAS419

Objective:
The course contents are interesting & include coordination chemistry. Justification of complexes by different theories for example Werner's theory, VBT, MOT & CFT. The nomenclature of complexes is of great interest for the knowledge of the student. The general & special properties of transition elements have been discussed in detail. The metallurgy of few elements is also included. a simple discussion on lanthanides & actinides has been given for knowledge & understanding.

Course Outcomes:
The complexes are of great interest having different shapes, colors & magnetic properties. The complexes are also used medically in cancer treatment. Stereochemistry of the complexes having coordination number IV & VI are of great interest & getting knowledge for the student. The transition elements are of great use in industry & they are used in multiple purposes in our daily life, ornaments & utensils.

Course Contents:

Unit I  
Coordination Chemistry I:  
(Lectures 08)
Werner’s theory, valence bond theory (inner and outer orbital complexes), Crystal field theory, measurement of 10 Dq (o), CFSE in weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq (o, t). Octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry Jahn-Teller theorem, square planar geometry.

Unit II  
Coordination Chemistry II:  
(Lectures 08)
Qualitative aspect of Ligand field and MO Theory, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, polynuclear complexes, Labile and inert complexes.

Unit III  
Transition Elements:  
(Lectures 08)
General group trends with special reference to electronic configuration, colour, variable valency, magnetic and catalytic properties, ability to form complexes. Stability of various oxidation states and e.m.f. (Latimer & Bsworth diagrams). Difference between the first, second and third transition series.

Unit IV  
Lanthanoids and Actinoids:  
(Lectures 08)
Electronic configuration, oxidation states, colour, spectral and magnetic properties, lanthanide contraction, separation of lanthanides (ion-exchange method only).

Unit V  
Bioinorganic Chemistry:
(Lectures 08)
Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals. Sodium / K-pump,
carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine. Iron and its application in bio-systems, Hemoglobin; Storage and transfer of iron.

Text & Reference Books:

1. Purcell, K.F & Kotz, J.C. Inorganic Chemistry W.B. Saunders Co.

* Latest editions of all the suggested books are recommended
Semester-IV
Organic Chemistry-III

Course Code: BAS412
L T P C
4 0 0 4

Objective:

- To give a basic idea to students regarding nomenclature, synthesis & structure of Aromatic Nitro Compounds, Poly-nuclear aromatic Hydrocarbons, Heterocyclic aromatic Hydrocarbons & Alkaloids.
- To extract & isolate the naturally occurring alkaloids from their parent materials by chemical methods

Course Outcomes:
The syllabus consists of the preparation properties & structure of compound containing nitro group, poly-nuclear hydrocarbons, as well as heterocyclic compounds. The alkaloids & terpenes are the compounds obtain from the natural source. The uses of these compounds are of great interest in the preparation of perfumes & analgesic drugs.

Course Contents:

Unit –I (08 Lectures)
Nitrogen Containing Functional Groups:
Preparation and important reactions of nitro compounds, nitriles and isonitriles
Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann’s exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid.
Diazonium Salts: Preparation and their synthetic applications.

Unit –II (08 Lectures)
Polynuclear Hydrocarbons:
Reactions of naphthalene phenanthrene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene; Polynuclear hydrocarbons.

Unit –III (08 Lectures)
Heterocyclic Compounds I:
Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene

Unit –IV (08 Lectures)
Heterocyclic Compounds II:
Pyridine (Hantzsch synthesis), Pyrimidine, Structure elucidation of indole, Fischer indole synthesis and Madelung synthesis), Structure elucidation of quinoline and isoquinoline, Skraup synthesis, Friedlander’s synthesis, Knorr quinoline synthesis, Doebner-Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler reaction, Pomeranz-Fritsch reaction.
Unit –V  
(08 Lectures)

Alkaloids & Terpenes:
Natural occurrence, General structural features, Isolation and their physiological action
Hoffmann’s exhaustive methylation, Emde’s modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Cocaine, and Reserpine. Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and α-terpineol.

Text & Reference Books:


* Latest editions of all the suggested books are recommended
Semester-IV
Physical Chemistry-IV

Course Code: BAS413

L T P C
4 0 0 4

Objective: The present syllabus consists of electrolytic dissociation, study of conductivity measurements for the determination of degree of dissociation of weak electrolyte, ionic product of water etc.

Course Outcome: The student will be able to learn Lambert and beer law & its application for photochemical reactions. The conductivity measurements & chemical kinetics may be used to know the ionic velocities of the ions. The various forms of catalysts and its impact on various reactions will be known.

Course Contents:
Unit –I (08 Lectures)
Conductance I:

Unit –II (08 Lectures)
Conductance II:
Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

Unit –III (08 Lectures)
Electrochemistry I:
Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Rules of oxidation/reduction of ions based on half-cell potentials
Quantitative aspects of Faraday’s laws of electrolysis, applications of electrolysis in metallurgy and industry.

Unit –IV (08 Lectures)
Electrochemistry II:
Application of EMF measurements in determining
(i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone electrodes. Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).
Unit – V (08 Lectures)
Basic ideas of electrostatics, Electrostatics of dielectric media, Clausius-Mosotti equation, Lorenz-Laurentz equation, Dipole moment and molecular polarizabilities and their measurements. Diamagnetism, Para magnetism, magnetic susceptibility and its measurement, molecular interpretation.

Text & Reference Books:

2. Castellan, G. W. Physical Chemistry, Narosa.

* Latest editions of all the suggested books are recommended
Semester-IV
Computer Skills for Chemist

Course Code: BAS414

Objectives:
Understanding versatile application of computer and digital graphics in Chemistry; learning the techniques and methods of use of computer and various software digital drafting and presentations.

Unit –I
Basic Computer Skills: (08 Lectures)
Introduction to computers hardware and software components; operating systems of Windows. Usage of Internet and Intranet; protocols and their importance; networking.

Unit –II
M. S. Word: Basic commands to operate the components of M.S. Word; knowledge about DTP (Desktop Publishing); techniques in M.S. Word; use of various commands to make charts, graphs, tables etc. to prepare reports in M.S. Word; exporting & importing such works done in other software; using of Clip Art and making elementary shapes in M.S. Word; use of Mail Merge in M.S. Word.

Unit –III
MS Excel: Making work sheets and inserting bar charts, pie charts etc. in M.S. Excel; learning basic calculation formulae like SUM, MAX, MIN, AVG, Percentage, etc.

Unit –IV
MS PowerPoint: Presentation in M.S. Power point in making slides etc. using various slide layouts, design themes and inserting animations.

Unit –V
Photo editing Software: Introduction to application of software and graphic system; use of printers, scanner, plotter; understanding Bitmap images and Vector Graphics; image size and Resolution; using Photo editing software such as Adobe Photoshop, Photo editor etc.; basic tools for Editing and Creating Graphics.
Internet Browsing: Net Surfing, Search Engine, Email

Text & Reference Books:

* Latest editions of all the suggested books are recommended
Semester IV
English Communication and Soft Skills – IV

Course Code: BHM499/EHM599/699

L   T   P   C
1   1   2   2

Objectives:
1. To enable the learners to inculcate the skills of technical writing.
2. To enable the learners to proactively participate in Job Oriented activities.
3. To enable the learners to be aware of corporate Skills.

Course Outcomes: At the end of the semester, the learners will be able to
1. Formulate their CVs along with cover letter in Job oriented perspective.
2. Communicate technically in functional context.
3. Proactively participate in Job Oriented activities. (Like Interview, GD etc.)
4. Aware of the skills required in corporate world.

Course Contents:
Unit – I: Job Oriented Skills (10 Hours)
• Cover Letter
• Preparing Resume and Curriculum-Vitae
• Writing Joining Report

Unit – II: Technical Communication (12 Hours)
• Technical description of engineering objects
• Data Interpretation: Tables, Charts, & Graphs
• Preparing Agenda & Minutes of the Meeting
• Technical Proposal: Types, Significance, Structure & AIDA
• Report Writing: Types, Structure & Steps towards Report writing

Unit- III: Interview Skills (10 Hours)
• Branding yourself
• Interview: Types of Interview, Tips for preparing for Interview and Mock Interview
• Group Discussion: Do’s and Don’ts of Group Discussion
• Negotiation skills

Unit – IV: Corporate Skills (8 Hours)
• Corporate Expectation
• Service mindset: Selling a product - Ad made shows
• Goal setting
• Team Building & Leadership
• Professional Ethics

Reference Books:
• Chaudhary, Sarla “Basic Concept of Professional Communication” Dhanpat Rai Publication,
New Delhi.
- Agrawal, Malti “Professional Communication” Krishana Prakashan Media (P) Ltd. Meerut.

**Note:**
- For effective communication practice, groups will be changed weekly
- Class (above 30 students) will be divided into two groups for effective teaching.

### Evaluation Scheme

<table>
<thead>
<tr>
<th>Internal Evaluation</th>
<th>External Evaluation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Marks</td>
<td>50 Marks</td>
<td>100</td>
</tr>
<tr>
<td>40 Marks (Progressive Evaluation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After each unit-completion:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignments / oral Presentation</td>
<td>10 Marks (Attendance)</td>
<td>25 Marks (Midway external assessment (Viva)*)</td>
</tr>
</tbody>
</table>

**Note:** Midway external assessment of 25 marks will be submitted and considered with external evaluation with a total of 50 marks.

*Parameters of Midway external assessment (Viva)*

<table>
<thead>
<tr>
<th>Knowledge of frequently asked questions</th>
<th>Body Language</th>
<th>Communication skills</th>
<th>Confidence</th>
<th>Voice Modulation</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 Marks</td>
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<td>05 Marks</td>
<td>05 Marks</td>
<td>05 Marks</td>
<td>25 Marks</td>
</tr>
</tbody>
</table>

**Note:** To take corrective actions, midway assessment will be conducted by 2-member committee of Director’s nominee (not by the faculty teaching English courses) and average of the two would be the 25 marks obtained by the students after two units are completed.

**Parameters of External Viva**

<table>
<thead>
<tr>
<th>Knowledge of frequently asked questions</th>
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<td>05 Marks</td>
<td>25 Marks</td>
</tr>
</tbody>
</table>

**Note:** External Viva will be conducted by 3-member committee comprising

a) Faculty teaching the class
b) English faculty from other college of the University (As approved by VC).
c) T&P officer of other colleges of the University (As approved by VC).

Each member will evaluate on a scale of 25 marks and the average of three would be the 25 marks obtained by the students.
Semester-IV
Inorganic Chemistry-III (Lab)

Course Code: BAS461  
L  T  P  C  
0  0  3  2

Objectives: This course content consists of Gravimetric estimation, Inorganic preparation purification of metal ions by paper chromatography.

Course Outcomes:  
After performing this lab, the student will learn about gravimetric analysis, preparation of inorganic compounds & separation of metal ions.

List of Experiments:

Gravimetric Analysis:  
2. Estimation of copper as CuSCN
3. Estimation of iron as Fe₂O₃ by precipitating iron as Fe(OH)₃.

Inorganic Preparations:  
4. Tetraamminecopper (II) sulphate, [Cu(NH₃)₄]SO₄H₂O
5. Cis K[Cr(C₂O₄)₂. (H₂O)₂] Potassium dioxalatodiaquachromate (III)
6. Tetraamminecarbonatocobalt (III) ion
7. Potassium tris(oxalate)ferrate(III)

Chromatography of metal ions  
8. Principle involved in chromatographic separations. Paper chromatographic separation of following metal ions:  
   a) Ni (II) and Co (II)     
   b) Fe (III) and Al (III)

Text & Reference Book:  

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:  
Internal Evaluation (50 marks)  
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.
Evaluation scheme:

<table>
<thead>
<tr>
<th>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEMESTER (35 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
<th>TOTAL INTERNAL (50 MARKS)</th>
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</thead>
<tbody>
<tr>
<td>EXPERIMENT (5 MARKS)</td>
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<td></td>
</tr>
<tr>
<td>ATTENDANCE (10 MARKS)</td>
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</tr>
</tbody>
</table>

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

<table>
<thead>
<tr>
<th>EXPERIMENT (20 MARKS)</th>
<th>FILE WORK (10 MARKS)</th>
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</tr>
</thead>
</table>
Semester-IV
Organic Chemistry-III (Lab)

Course Code: BAS462
L T P C 0 0 3 2

Objectives: Emphasis is given for the detection of elements present in the inorganic compound, functional group identification & confirmation of organic compounds.

Course Outcomes:
The portion of practical work gives an Idea for the detection of the extra elements & functional groups present in an unknown organic sample.

List of Experiments:

1. Detection of extra elements.
2. Functional group test for nitro, amine and amide groups.
3. Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols and carbonyl compounds)

Text & Reference Books:


* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

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Semester-IV  
Physical Chemistry-IV (Lab)

Course Code: BAS465  
L   T   P   C  
0   0   3   2

**Objective:** The course content consists of conductance of weak & strong acids and kinetics of the chemical reactions. The acid hydrolysis of the ethyl acetate is carried out with HCl & it is determined conductometrically. Saponification of ethyl acetate is also included to enhance the interest of the student.

**Course Outcomes:** After performing all these experiments students will be able to learn conductometric titrations of strong or weak acids & strong or weak base & its mixtures. Determination of rate constants by initial rate method & integrated rate methods will also be clear. The process of saponification will also be understood more clearly.

**List of Experiments:**

**Conductometry:**
1. Determination of cell constant
2. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
3. Perform the following conductometric titrations:
   a) Strong acid vs. strong base  
   b) Weak acid vs. strong base  
   c) Mixture of strong acid and weak acid vs. strong base  
   d) Strong acid vs. weak base

**Potentiometry:**
1. Perform the following potentiometric titrations:
   a) Strong acid vs. strong base  
   b) Weak acid vs. strong base  
   c) Dibasic acid vs. strong base  
   d) Potassium dichromate vs. Mohr's salt

**Text & Reference Books:**

*Latest editions of all the suggested books are recommended*
Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

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Semester IV
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP411

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IIInd & IIIrd CT in semester:

<table>
<thead>
<tr>
<th>S No.</th>
<th>Enroll No.</th>
<th>Student Name</th>
<th>Dress code</th>
<th>Participation in Conferences /Workshops / Seminars</th>
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<th>Participation in community Services</th>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18
Objective: The course content consists of types of carbohydrate and their structures. The disaccharides & polysaccharides are of great use in our daily life. It also consists of emphasis on amino acids, RNA & DNA, Amino acids, proteins & peptide bond formation.

Course Outcome: The occurrence of carbohydrate and their biological importance plays important role in human life. We have been studied in detail for the benefit of mankind. The students are given knowledge of structure & composition of RNA & DNA along with the different types of bases present in the structure. The synthesis of amino acids and properties are of great importance as they form the protein which is responsible for good health.

Course Contents:

Unit I
Carbohydrates: (Lectures 08)
Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation;
Disaccharides – Structure elucidation of maltose, lactose and sucrose.
Polysaccharides – Elementary treatment of starch, cellulose and glycogen.

Unit II
Amino Acids, Peptides and Proteins: (Lectures 08)
Amino acids, Peptides and their classification.

Unit III
Nucleic Acids: (Lectures 08)
Components of nucleic acids, Nucleosides and nucleotides; Structure, synthesis and reactions of: Adenine, Guanine, Cytosine, Uracil and Thymine.

Unit IV
Enzymes: (Lectures 08)
Introduction, classification and characteristics of enzymes. Salient features of active site Tof enzymes. Mechanism of enzyme action, factors affecting enzyme action, coenzymes and cofactors and their role in biological reactions, specificity of enzyme action, enzyme inhibitors and their importance, phenomenon of inhibition.
Unit – V

Concept of Energy in Biosystems:

Text & Reference Books:

* Latest editions of all the suggested books are recommended
Objective: The syllabus consists of chemical bonding namely VBT, MOT to explain the structure of homonuclear & heteronuclear diatomic molecules. Molecular, vibrational, Raman and NMR spectroscopy have been taught with special reference to their principles & their applications to find out the structure of the compound.

Course Outcome: VBT & MOT will be understood more clearly by students. For instance, the formation of diatomic molecules, bond order, the molecular spectroscopy & rotational spectroscopy to find out the spectral lines for diatomic & triatomic molecules will be known by students. Thus, the structure & groups of organic & inorganic compounds will be known by students.

Course Contents:
Unit – I (08 Lectures)
Rotational spectroscopy:
Interaction of electromagnetic radiation with molecules and various types of spectra; Born-Oppenheimer approximation.
Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Unit – II (08 Lectures)
Vibrational Spectroscopy:
Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

Unit – III (08 Lectures)
Raman and electronic spectroscopy:
Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion. Application of IR and Raman spectroscopy.
Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation.

Unit – IV (08 Lectures)
NMR and ESR Spectroscopy:
Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy, Larmor precession, chemical shift and low-resolution spectra, different scales, spin-spin coupling and high-resolution spectra, interpretation of PMR spectra of organic molecules.
Electron Spin Resonance (ESR) spectroscopy: Its principle, hyperfine structure, ESR of simple radicals.
Unit – V (08 Lectures)

Photochemistry:
Characteristics of electromagnetic radiation, Lambert-Beer’s law and its limitations, physical significance of absorption coefficients. Laws of photochemistry, quantum yield, actinometry, examples of low and high quantum yields, photochemical equilibrium and the differential rate of photochemical reactions, photosensitized reactions, quenching. Role of photochemical reactions in biochemical processes (PHOTOSYNTHESIS), photo stationary states, chemiluminescence.

Text & Reference Books:


* Latest editions of all the suggested books are recommended
Objective: Analytical Chemistry is unique experimental science where better methods of analysis adopted with the sophisticated instruments. The entire syllabus is useful for knowledge of basic concepts to the students for studying UV-Vis, IR Spectroscopy. Chromatography has great qualitative and quantitative aspects of analysis in various field of chemistry.

Course Outcome: The student will enjoy reading & studying this paper with a zeal and enthusiasm and will have a great confidence in understanding basic concept concerning analytical chemistry.

Course Contents:

Unit – I (08 Lectures)
Qualitative and quantitative aspects of analysis:
Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if indeterminate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Unit – II (08 Lectures)
Optical methods of analysis:
UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument;
Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator& detector) for single and double beam instrument; sampling techniques,
Effect and importance of isotope substitution.
Flame Atomic Absorption and Emission Spectrometry: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction.

Unit – III (08 Lectures)
Thermal and Electroanalytical methods of analysis:
Theory of thermogravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture.
Classification of electroanalytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pKa values.

Unit – IV (08 Lectures)
Separation techniques I:
Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of
extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous and counter current extractions. Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and non-aqueous media.

Unit – V

Separation techniques II:

Text & Reference Books:

5. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age International Publisher.

* Latest editions of all the suggested books are recommended
Semester-V
Polymer Chemistry

Course Code: BAS528

Objective: The course content provides an idea to the students about the basic concepts and kinetics of the polymers along with structural identification and uses in the industries.

Course Outcome: This course content provides an outstanding exposure about the detailed studies of polymers.

Course Contents:
Unit – I
Basic Concepts: (08 Lectures)

Unit – II
Kinetics and Mechanism: (08 Lectures)

Unit – III
A) Structure and Properties (08 Lectures)

B) Polymer characterization and analysis
Unit – IV (08 Lectures)

**Industrial Natural Polymers:**


Unit – V (08 Lectures)

**Specialty Polymers:**


**Text & Reference Books:**

4. G. S. Misra – Introduction to Polymer Chemistry, Wiley Eastern Ltd.,

*Latest editions of all the suggested books are recommended*
Semester-V
Organic Chemistry-IV (Lab)

Course Code: BAS561  
L   T   P   C  
0   0   3   2

Objective: The course content is of great interest in which the students are taught for the estimation of amino acids & proteins by standard methods.

Course Outcome: This part of the syllabus gives an idea to the students for the estimation of amino acids & their role in the preparation of proteins.

List of Experiments:

1. Estimation of glycine by Sorenson’s formalin method.
2. Estimation of proteins by Lowry’s method.
3. Study of the action of salivary amylase on starch at optimum conditions.
5. Saponification value of oil or a fat.
6. Determination of Iodine number of an oil/ fat.

Text & Reference Books:

1. Manual of Biochemistry Workshop, Department of Chemistry, University of Delhi.

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

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Semester-V
Physical Chemistry-V (Lab)

Course Code: BAS562

Objective: Adsorption, Determination of heat of solution, relative strength of acids, kinetic studies of acetone & iodine & molecular rate determination have been included.

Course Outcome: The students will be able to learn the concept of adsorption & absorption and solubility phenomenon. They will be aware of Acid strength & kinetic studies as per the system given in the syllabus. Lastly the molecular weight determination by Rast methods & Duma's method will be clearer after performing the experiments.

List of Experiments:

UV/Visible spectroscopy:

i. Study the 200-500 nm absorbance spectra of KMnO4 and K2Cr2O7 (in 0.1 M H2SO4) and determine the λmax values. Calculate the energies of the two transitions in different units (J molecule\(^{-1}\), kJ mol\(^{-1}\), \(\text{cm}^{-1}\), eV).
ii. Study the pH-dependence of the UV-Vis spectrum (200-500 nm) of K2Cr2O7.
iii. Record the 200-350 nm UV spectra of the given compounds (acetone, acetaldehyde, 2-propanol, acetic acid) in water. Comment on the effect of structure on the UV spectra of organic compounds.

Colourimetry:

i. Verify Lambert-Beer’s law and determine the concentration of CuSO4/KMnO4/K2Cr2O7 in a solution of unknown concentration.
ii. Determine the concentrations of KMnO4 and K2Cr2O7 in a mixture.
iii. Study the kinetics of iodination of propanone in acidic medium.
iv. Determine the amount of iron present in a sample using 1,10-phenathroline.
v. Determine the dissociation constant of an indicator (phenolphthalein).
vi. Study the kinetics of interaction of crystal violet/phenolphthalein with sodium hydroxide.

Text & Reference Books


*Latest editions of all the suggested books are recommended*
Evaluation Scheme of Practical Examination:

**Internal Evaluation (50 marks)**
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Semester-V
Analytical Chemistry (Lab)

Course Code: BAS563

Objective: The course content is of great importance for the student to learn the separation of mixtures by chromatographic, solvent extraction methods & the compounds are identified by Spectrophotometric method.

Course Outcome: This is of great interest for the student to know about separation & identification of compounds.

List of Experiments:

I. Separation Techniques:

1. Chromatography:

   (a) Separation of mixtures

      i. Paper chromatographic separation of Fe$^{3+}$, Al$^{3+}$, and Cr$^{3+}$.

      ii. Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the Rf values.

   (b) Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their Rf values.

   (c) Chromatographic separation of the active ingredients of plants, flowers and juices by TLC

II. Solvent Extractions:

2. To separate a mixture of Ni$^{2+}$ & Fe$^{2+}$ by complexation with DMG and extracting the Ni$^{2+}$-DMG complex in chloroform, and determine its concentration by spectrophotometry.

   i. Solvent extraction of zirconium with amberliti LA-1, separation from a mixture of irons and gallium.

3. Determine the pH of the given aerated drinks fruit juices, shampoos and soaps.

4. Determination of Na, Ca, Li in cola drinks and fruit juices using flame photometric techniques.

5. Analysis of soil:

   i. Determination of pH of soil.

   ii. Total soluble salt

   iii. Estimation of calcium, magnesium, phosphate, nitrate

6. Ion exchange:

   i. Determination of exchange capacity of cation exchange resins and anion exchange resins.

III Spectrophotometry:

7. Determination of pKa values of indicator using spectrophotometry.

8. Structural characterization of compounds by infrared spectroscopy.
Text & Reference Books:
5. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age International Publisher.

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
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Semester-V  
Polymer Chemistry (Lab)

**Course Code:** BAS564  
L T P C  
0 0 3 2

**Objective:** The course content consists of preparation, molecular weight determination, mechanical properties & hydroxyl number.

**Course Outcome:** Polymer chemistry is of great interest for the students & its wide applications in the preparation of industrial parts & variety of products which are of great benefit to support industry.

**List of Experiments:**

**Polymer synthesis:**
1. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
   a) Purification of monomer  
   b) Polymerization using benzoyl peroxide (BPO) / 2,2’-azo-bis-isobutylonitrile (AIBN)
2. Preparation of nylon 66/6
3. Precipitation polymerization of acrylonitrile
4. Preparation of urea-formaldehyde resin
5. Preparations of novalac resin/ resold resin.

**Polymer characterization:**
1. Determination of molecular weight by viscometry:  
   a. Polyacrylamide-aq. NaNO2 solution  
   b. (Poly vinyl propylidine (PVP) in water  
2. Determination of the viscosity-average molecular weight of poly(vinyl alcohol) (PVOH) and the fraction of “head-to-head” monomer linkages in the polymer.
3. Determination of molecular weight by end group analysis: Polyethylene glycol (PEG) (OH group).
5. Determination of hydroxyl number of a polymer using colorimetric method.

**Polymer analysis:**
1. Estimation of the amount of HCHO in the given solution by sodium sulphite method

**Text & Reference Books:**

*Latest editions of all the suggested books are recommended*

**Evaluation Scheme of Practical Examination:**
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

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**Semester V**

**DISCIPLINE & GENERAL PROFICIENCY**

**Course Code: BGP511**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

<table>
<thead>
<tr>
<th>S No</th>
<th>Enroll No.</th>
<th>Student Name</th>
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<th>Participation in Conferences /Workshops / Seminars</th>
<th>Participation in guest lectures, invited talks and special technical sessions</th>
<th>Participation in community Services</th>
<th>Participation in Culture &amp; extra curriculum activities, Department Club Activities</th>
<th>Participation in sports/ co-curricular activities</th>
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<td>Mentor</td>
<td>Director or Principal</td>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18  Page 90
Semester-VI
Inorganic Chemistry-IV

Course Code: BAS624

Objective: It consists of theoretical principals in qualitative analysis of mixture including two basic radicals & two acidic radicals, synthesis, structure & bonding of organometallic compounds & metal carbonyls. Catalytic process plays an important role in industry.

Course Outcome: The qualitative analysis is of great interest to conform the presence of acidic & basic radicals, The students have taught easy flow sheet for mixture analysis. Preparation, structure & bonding of organometallic compounds & its industrial importance have been studied in detailed.

Course Contents:
Unit – I
Theoretical Principles in Qualitative Analysis: (08 Lectures)
Basic principles involved in analysis of cations and anions, solubility products, common ion effect. Principals involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate).

Unit – II
Organometallic Compounds I: (08 Lectures)
Definition and classification of organometallic compounds, hapticity of organic ligands, 18 electron rules in metal carbonyls. General methods of preparation of mono and binuclear carbonyls of 3d series. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect. Zeise’s salt: Preparation and structure, evidences of synergic effect.

Unit – III
Organometallic Compounds II: (08 Lectures)
Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkyl aluminium (dimer), concept of multicentre bonding in these compounds. Role of triethylaluminium in polymerisation of ethene (Ziegler – Natta Catalyst). Ferrocene: Preparation and reactions (acetylation, alklylation, metallation, Mannich Condensation). Structure and aromaticity. Comparison of aromaticity and reactivity with that of benzene.

Unit – IV
Reaction Kinetics and Mechanism: (08 Lectures)
Introduction to inorganic reaction mechanisms. Substitution reactions in square planar complexes, Trans- effect, theories of trans effect, Mechanism of nucleophilic substitution in square planar complexes, Thermodynamic and Kinetic stability, Kinetics of octahedral substitution, Ligand field effects and reaction rates, Mechanism of substitution in octahedral complexes.

Unit – V
Catalysis by Organometallic Compounds: (08 Lectures)
General principles, properties and types of catalysts; Role of catalyst in industrial processes.
Alkene hydrogenation (Wilkinson's Catalyst), Hydroformylation (Co salts), Wacker Process, Synthetic gasoline (Fischer Tropsch reaction), Synthesis gas by metal carbonyl complexes Deactivation or regeneration of catalysts. Phase transfer catalysts,

Text & Reference Books:
1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Prentice Hall.
2. Cotton, F.A.G.; Wilkinson & Gaus, P.L. Basic Inorganic Chemistry; Wiley India,

* Latest editions of all the suggested books are recommended
Semester-VI
Organic Chemistry-V

Course Code: BAS625

Objective: To tell Students deeply regarding the different Spectral techniques like: UV-Vis, Infra-Red & NMR as well as its application in characterization of an organic molecule. A brief study of dyes, its constituents & their application. Preparation, Properties & application of polymers.

Course Outcome: Students will gather enough knowledge of principles of different spectral techniques & its application in Characterize & interpretation the spectra of organic compounds. Students can gain enough knowledge regarding dyes, polymers, lipids & its industrial application.

Course Contents:
Unit – I (08 Lectures)
UV Spectroscopy: General principles Introduction to absorption and emission spectroscopy Types of electronic transitions, λmax, Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward Rules for calculation of λmax for the following systems: α,β unsaturated aldehydes, ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.

Unit – II (08 Lectures)
IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorption positions of O, N and S containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in functional group analysis.

Unit – III (08 Lectures)
NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple compounds.
Applications of IR, UV and NMR for identification of simple organic molecules.

Unit – IV (08 Lectures)
Dyes: Classification, Colour and constitution; Mordant and Vat Dyes; Chemistry of dyeing; Synthesis and applications of: Azo dyes – Methyl Orange and Congo Red (mechanism of Diazo Coupling); Triphenyl Methane Dyes -Malachite Green, Rosaniline and Crystal Violet; Phthalein Dyes – Phenolphthalein and Fluorescein; Natural dyes –structure elucidation and synthesis of Alizarin and Indigotin; Edible Dyes with examples.

Unit V (08 Lectures)
Polymers:
Introduction and classification, Number average molecular weight, Weight average molecular weight, Degree of polymerization, Addition and condensation -Mechanism of cationic, anionic and free radical addition polymerization; Ziegler-Natta polymerisation of alkenes;
Preparation and applications of plastics – thermosetting (phenol-formaldehyde, Polyurethanes) and thermosoftening (PVC, polythene);
Fabrics – natural and synthetic (acrylic, polyamido, polyester); Rubbers – natural and synthetic: Buna-S, Chloroprene and Neoprene; Vulcanization.

Text & Reference Books:


* Latest editions of all the suggested books are recommended
Semester-VI
Green Chemistry

Course Code: BAS626

Objective:
- To make the students aware of the impact of Chemistry on environment and
  imbibe the concept of sustainable developments
- To educate the students with respect to skills and knowledge to practice chemistry
  in ways that are benign to health and environment

Course Outcomes: After studying this paper students get trained in Chemistry at advanced
level in a more holistic way & they become confident and capable of accepting any
challenge in Chemistry.

Course Contents:
UNIT- I  (08 Lectures)
Principles & Concept of Green Chemistry: Introduction–Concept and Principles -
development of Green Chemistry- Atom economy reactions–rearrangement reactions,
addition reactions- atom uneconomic-sublimation-elimination-Wittig reactions-toxicity
measures- Need of Green Chemistry in our day to day life.

UNIT- II  (08 Lectures)
Measuring and Controlling Environmental Performance- Importance of measurement
-- lactic acid production-safer Gasoline -- introduction to life cycle assessment-four stages
of Life Cycle Assessment (LCA) --Carbon foot printing-green process Matrics-eco labels -
Integrated Pollution and Prevention and Control(IPP C)-REACH (Registration, Evaluation,
Authorization of Chemicals)

UNIT- III  (08 Lectures)
Emerging Green Technology and Alternative Energy Sources- Design for Energy
efficiency-Photochemical reactions- Advantages-Challenge faced by photochemical
process. Microwave technology on Chemistry- Microwave heating --Microwave assisted
reactions-Sono chemistry and Green Chemistry --Electrochemical Synthesis-Examples of
Electrochemical synthesis.

UNIT- IV  (08 Lectures)
Renewable Resources-Biomass --Renewable energy -- Fossil fuels-Energy from Biomass-
Solar Power- Other forms of renewable energy-Fuel Cells-Alternative economics-Syngas
economy- hydrogen economy-Bio refinery chemicals from fatty acids-Polymer from
Renewable Resources --Some other natural chemical resources.

UNIT- V  (08 Lectures)
Industrial Case Studies- Methyl Methacrylate (MMA)-Greening of Acetic acid
manufacture-Vitamin C-Leather manufacture --Types of Leather --Difference between Hide
and Skin-Tanning --Reverse tanning -- Vegetable tanning --Chrome tanning-Fat liquoring --
Dyeing --Application-Polyethylene- Ziegler Natta Catalysis-Metallocene Catalysis-Eco
friendly Pesticides-Insecticides.
Text Books:
2. V.K. Ahluwalia, Green Chemistry, Environmentally Benign Reaction
3. Mike Lancaster, Green Chemistry and Introductory text, II Edition

Reference Books:

*Latest editions of all the suggested books are recommended.*
Semester VI
Open Elective

Introduction to Statistical Package for Social Sciences

Subject Code: BAS011
L    T   P   C
3    0    0    3

Objectives: This course is intended for students with limited or no experience with the statistical package SPSS. This course is designed to give students the necessary skills to analyze research projects.

Course Outcomes:
- Understanding the layout and interface of SPSS
- Introducing the main menus
- Opening and creating new datasets
- Analyzing data using descriptive statistics

Course Contents-

Unit-I (Lectures 08)
Introduction to SPSS: Overview of statistical packages; Data analysis with SPSS: General aspects, workflow, and critical issues; SPSS interface: data, variable, output, and syntax view; General description, functions, menus, and commands.

Unit-II (Lectures 08)
Input and data management: Defining variables; Entering and modifying data: manual and automated input of data, and file import; Data Management: Listing cases, replacing missing values, computing new variables, exploring data, selecting cases, sorting cases, merging files etc.; Data Transformation; Output management.

Unit-III (Lectures 08)
Descriptive analysis of data: Frequencies; Descriptive Statistics: measures of central tendency, variability, deviation from normality; Crosstabs and chi-square analyses; Charts: creating & editing graphs (Bar; histograms; scatter diagram; percentiles etc.).

Unit-IV (Lectures 08)
Statistical tests: Parametric Tests: Means; t-test (Independent samples, paired samples, and one sample tests); One-way ANOVA; Non parametric tests: Mann-Whitney U, Wilcoxon signed-rank, Kruskal-Wallis.

Unit-V (Lectures 08)
Correlation and regression: Correlation: Bivariate and Partial correlation; correlation matrix; Regression: Simple linear regression; Multiple regression analysis; Factor analysis, Cluster analysis.
**Text and References Books:**


*Latest editions of all the suggested books are recommended.*
Industrial Chemistry

Course Code: BAS012

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Objective: Industrial chemistry course content include silicate technology, glass manufacturing, nitogenous & phosphate fertilizers and application of lubricants. The other industrial preparations are soap, detergents, paints, insecticides & drug.

Course Outcome:
Silicate is of great importance in our daily life as they are used in industry for making sheets. Production of glass, fertilizers and lubricants, soap, detergents, paints, insecticides & drug have great importance in human life.

Course Contents:

Unit I
Silicate Industries: (08 Lectures)
Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.
Ceramics: Important clays and feldspar, ceramic, their types and manufacture. Hightechnology ceramics and their applications.
Cements: Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit II
Fertilizers: (08 Lectures)
Different types of fertilizers. Need for fertilizers, Straight and mixed fertilizers, Sources of fertilizers, Artificial fertilizers, Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, Ammonium sulphate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate. NPK fertilizers.

Unit III
Alloys: (08 Lectures)
Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demagnetization, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

Unit IV
Paints and Pigments: (08 Lectures)
Introduction, Characteristic of the pigments Classification of paints, Manufacture of paints, for example white lead, Sublimed white lead (Basic sulphate), Zinc oxide, Lithophone, Titanium dioxide, manufacture, Ultramarine blue, Read lead, Chrome green, Guignet’s green, Reinmann’s green, Setting of the paints Requirements of a good paint Emulsion paints, Constituents of emulsion paints. Advantages, Luminescent paints. Heat resistant paints, Varnishes, Manufacturing of varnishes, Lacquers, Solvents and thinners.

Unit V
Soaps & Detergents: (08 Lectures)
Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of
fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.
Soap: Soap and its manufacture, Toilet and transparent soap, Other soaps, Oil to be used for
soap, Cleansing action of soap.
Detergents: Principal groups of synthetic detergents, Classification of surface active agents,

**Text & Reference Books:**

   Publications, New Delhi.

*Latest editions of all the suggested books are recommended*
Introduction to Nanoscience & Technology

Course Code: BAS013

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Objective: To study physical properties of nanoscale systems, QDs, Synthesis of various nanomaterials, characterization & applications of nanomaterials etc.

Course Outcomes: After completion of the course, student will be able to understand

- The physical properties of nanoscale systems.
- The QDs, Synthesis of various nanomaterials.
- The characterization & applications of nanomaterials.

Course Contents:

Unit I

Nanoscale Systems: Length, energy, and time scales - Quantum confinement of electrons in semiconductor nanostructures: Quantum confinement in 3D, 2D, 1D and zero dimensional structures- Size effect and properties of nanostructures- Landauer-Buttiker formalism for conduction in confined geometries - Top down and Bottom up approach.

Unit II


Unit III


Unit IV


Unit V

Text & References Books:


* Latest editions of all the suggested books are recommended
Semester-VI
Inorganic Chemistry-IV (Lab)

Course Code: BAS661

L  T  P  C
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Objective:
It consists of theoretical principals in qualitative analysis of mixture including two basic radicals & two acidic radicals

Course Outcome:
The student will be able to learn qualitative analysis using group reagents.

List of Experiments:
Qualitative semimicro analysis of mixtures containing 3 anions and 3 cations. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

CO$_3^{2-}$, NO$_2^-$, S$^2-$, SO$_3^{2-}$, SO$_2$O$_3^{2-}$, CH$_3$COO$^-$, F$^-$, Cl$^-$, Br$^-$, I$^-$, NO$_3^-$, BO$_3^{3-}$, C$_2$O$_4^{2-}$, PO$_4^{3-}$, NH$_4^+$, Pb$^{2+}$, Cu$^{2+}$, Cd$^{2+}$, Bi$^{3+}$, Sn$^{2+}$, Sb$^{3+}$, Fe$^{3+}$, Al$^{3+}$, Cr$^{3+}$, Zn$^{2+}$, Mn$^{2+}$, Co$^{2+}$, Ni$^{2+}$, Sr$^{2+}$, Ba$^{2+}$, Mg$^{2+}$, Ca$^{2+}$,

Mixtures should preferably contain one interfering anion, or insoluble component (BaSO$_4$, SrSO$_4$, PbSO$_4$, CaF$_2$ or Al$_2$O$_3$) or combination of anions e.g. CO$_3^{2-}$ and SO$_3^{2-}$, NO$_2^-$ and NO$_3^-$, Cl$^-$ and Br$^-$, Br$^-$ and I$^-$, NO$_3^-$ and Br$^-$, NO$_3^-$ and I$^-$.

Spot tests should be done whenever possible.

i. Controlled synthesis of two copper oxalate hydrate complexes.

ii. Preparation of acetylacetanato complexes of Cu$^{2+}$/Fe$^{3+}$. Find the $\lambda_{max}$ of the complex.

iii. Synthesis of ammine complexes of Ni(II) and its ligand exchange reactions (e.g. bidentate ligands like acetylacetone, DMG, glycine) by substitution method.

Text & Reference Books:
1. Vogel’s Qualitative Inorganic Analysis, Revised by G. Svehla. Pearson Education.

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

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<th>EXPERIMENT (5 MARKS)</th>
<th>FILE WORK (10 MARKS)</th>
<th>VIVA (10 MARKS)</th>
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<th>TOTAL INTERNAL (50 MARKS)</th>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18 Page 103
**External Evaluation (50 marks)**

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

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<th>EXPERIMENT (20 MARKS)</th>
<th>FILE WORK (10 MARKS)</th>
<th>VIVA (20 MARKS)</th>
<th>TOTAL EXTERNAL (50 MARKS)</th>
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**B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18**

Page 104
Objective: This course content provides an idea to the student for the extraction of caffeine from tea leaves, preparation of polymers & analysis of organic compounds.

Course Outcomes:
The syllabus provides an interesting field to the student for the separation, preparation & analysis of organic compounds based on functional group.

List of Experiments:
1. Extraction of caffeine from tea leaves.
2. Preparation of sodium polyacrylate.
3. Preparation of urea formaldehyde.
5. Qualitative analysis of unknown organic compounds containing monofunctional groups (carbohydrates, aryl halides, aromatic hydrocarbons, nitro compounds, amines and amides) and simple bifunctional groups, for e.g. salicylic acid, cinnamic acid, nitrophenols, etc.
6. Identification of simple organic compounds by IR spectroscopy (Spectra to be provided).
7. Preparation of methyl orange.

Text & Reference Books:

* Latest editions of all the suggested books are recommended

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:
### PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)

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<th>EXPERIMENT (5 MARKS)</th>
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<th>ATTENDANCE (10 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
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### External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

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**Semester-VI**  
**Green Chemistry (Lab)**

**Course Code: BAS663**  
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**Objective:**
The aim of green chemistry is very clear. The students are advised to use safe chemicals mostly reactions are carried out under natural sunlight to put any pollutant in nature. The catalyst and solvents used in green chemistry do not give any harmful impact on the environment.

**List of Experiments:**
1. Preparation and characterization of nanoparticles of gold using tea leaves.
2. Preparation of propene by two methods can be studied  
   i. Triethylamine ion + OH⁻ → propene + trimethylpropene + water  
   ii. (II) 1-propanol → propene + water  
3. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.  
5. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).  
6. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

**Text & Reference Books:**
2. Kirchoff, M. & Ryan, M.A. Greener approaches to undergraduate chemistry experiment. American Chemical Society, Washington DC.  
3. Ryan, M.A. Introduction to Green Chemistry, Tinnesand, American Chemical Society, Washington DC.  

*Latest editions of all the suggested books are recommended*

**Evaluation Scheme of Practical Examination:**

**Internal Evaluation (50 marks)**
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

**Evaluation scheme:**

<table>
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<tr>
<th>PRACTICAL PERFORMANCE &amp; VIVA DURING THE SEMESTER (35 MARKS)</th>
<th>ON THE DAY OF EXAM (15 MARKS)</th>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18  Page 107
External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

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<th>EXPERIMENT (20 MARKS)</th>
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B.Sc. (Hons.) Chemistry Syllabus Applicable w.e.f. Academic Session 2017-18  
Page 108
Semester-VI
Seminar, Viva & Presentation

Course Code: BAS698

For students to enter into preliminary research field both in theory and experiment the concept of Seminar, Presentation & Viva has been introduced in the final Semester. In this report, student will explore new developments from the books and journals, collecting literature / data and prepare the report in form of power point presentation based on his / her work and studies, and submit in concern department.

General guidelines are as follows-
1. Students will make seminar report which should be preferably a working of third thoughts based on their subject.
2. The student will be assigned a faculty guide who will be the supervisor of the students. The faculty would be identified at the end of the Vth semester.
3. Internal assessment of the students should be done at least twice in the semester.
4. The students shall present the final presentation live using overhead projector PowerPoint presentation on LCD to the internal committee and the external examiner.
5. The internal evaluation committee shall consist of faculty members constituted by the college which would be comprised of at least three members comprising of the department Coordinator’s, Class Coordinator and a nominee of the Director/Principal. The students guide would be special in invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each members of the committee.

The Marking shall be as follows.

Internal: 50 marks
By the Faculty Guide – 25 marks
By Committee appointed by the Director/Principal – 25 marks

External: 50 marks
By External examiner appointed by the University – 50
Top Cover- The sample top cover shall be as under:

**TITLE (18 pt Times New Roman CAPS)**

**SEMINAR REPORT (14)**

Submitted in Partial Fulfillment of the Requirements for the Degree of

**BACHELOR OF SCIENCE (16)**

In (16)

**Chemistry (16)**

Submitted by (12)

Name

Enrollment No

Under the guidance of (12)

Name of Guide & Designation (14)

Department of Chemistry (14)
Faculty of Engineering
Teerthanker Mahaveer University (14)
Moradabad-244001(14)

(December, 2017) (14)
# EVALUATION SHEET

(To be filled by the GUIDE & Internal Examiners only)

Name of Candidate: 
Roll No: 

Class and Section: 

Please evaluate out of Five marks each.

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<th>S. No.</th>
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<td>Literature Review / Background Work (Coverage, Organization, Critical Review)</td>
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Signature: 
Date:
### EVALUATION SHEET FOR EXTERNAL EXAMINER
(To be filled by the External Examiner only)

**Name of Candidate:**

**Roll No:**

I. For use by **External Examiner ONLY**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Details</th>
<th>Marks (10) each</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Objective Identified &amp; Understood</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Literature Review / Background Work (Coverage, Organization, Critical Review)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Discussion/Conclusions (Clarity, Exhaustive)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Power Point Presentation (Clear, Structured)</td>
<td></td>
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<tr>
<td>5.</td>
<td>Slides (Readable, Adequate)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total (Out of 50)</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Signature:**

**Date:**
### EVALUATION SUMMARY SHEET

(To be filled by External Examiner)

<table>
<thead>
<tr>
<th>Name and Roll No.</th>
<th>Internal Examiners (50)</th>
<th>External Examiner (50)</th>
<th>Total (100)</th>
<th>Result (Pass/Fail)</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Note:** The summary sheet is to be completed for all students and the same shall also be compiled for all students examined by External Examiner. The Format shall be provided by the course coordinator.
Semester VI
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP611  C-1

There shall be continuous evaluation of the student on the following broad parameters:

1. Obsvance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IIInd & IIIrd CT in semester:

<table>
<thead>
<tr>
<th>S No</th>
<th>Enroll No.</th>
<th>Student Name</th>
<th>Dress code</th>
<th>Participation in Conferences /Workshops / Seminars</th>
<th>Participation in guest lectures, invited talks and special technical sessions</th>
<th>Participation in community Services</th>
<th>Participation in Culture &amp; extra curriculum activities, Department Club Activities</th>
<th>General Behavior</th>
<th>Any Extra Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>(5)</td>
<td>(15)</td>
<td>(20)</td>
<td>(10)</td>
<td>(20)</td>
<td>(20)</td>
</tr>
</tbody>
</table>

Responsible for marks

<table>
<thead>
<tr>
<th>Mentor</th>
<th>Head</th>
<th>Head</th>
<th>Mentor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Events Coordinator &amp; Department Club Coordinator</td>
<td>Sports Coordinator</td>
<td>Director or Principal</td>
<td></td>
</tr>
</tbody>
</table>