		<b>SYLLABUS</b>
<b>Course Title</b>		<b>CHEMISTRY-I</b>
<b>Course Code</b>		BSC121
<b>Course Credit</b>	Lecture	: 04
	Practical	:03
	Tutorial	: 00
	Total	: 07
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>PERIODIC PROPERTIES</b> Explanation and general trends of the periodic properties like Atomic and ionic radii, Ionization Potential, Electronegativity, Electron affinity. Pauli's method for the determination of ionic radius of isoelectric ions and problems based on it.	<b>05</b>
<b>2</b>	<b>CO-ORDINATION COMPOUNDS</b> Introduction, Formation of co-ordination compounds, Classification of Ligands, Co-ordination number and Werner's Theory, IUPAC Nomenclature of co-ordination compounds, Effective Atomic Numbers(EAN), Valance Bond Theory for complexes, Examples to explain VB Theory: 1. $[\text{NiCl}_4]^{2-}$ , 2. $[\text{Ni}(\text{CN})_4]^{2-}$ , 3. $[\text{Fe}(\text{CN})_6]^{3-}$ , 4. $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ , 5. $[\text{Co}(\text{NH}_3)_6]^{2+}$ , 6. $[\text{CoF}_6]^{3-}$ , Importance and applications of co-ordination compounds	<b>05</b>
<b>3</b>	<b>ELEMENTS OF THE FIRST TRANSITION SERIES</b> Introduction and definition, Electronic configuration, Reversal of energies of 3d and 4s orbitals, Physical properties: Metallic, Crystal structure, Conductivity, Density, Catalytic properties, Tendency of formation of alloys. Atomic properties: Atomic and ionic radii, Ionisation potential, Oxidation states and their stability. Magnetic properties: Spectral properties, Nonstoichiometric, interstitial compounds.	<b>05</b>
<b>4</b>	<b>BASIC OF ORGANIC CHEMISTRY</b> IUPAC nomenclature, Rules of IUPAC nomenclature, Priority order, Introduction of Hydrocarbon, Saturated and unsaturated hydrocarbons. Cycloalkanes, IUPAC Nomenclature of Cycloalkanes: monocyclic, bicyclic and tricyclic systems, Method of preparation of small ring cycloalkanes: Fund's method, Perkin Method, Sabatier and Sanderson's Method, Dieckmann method. Physical properties of cycloalkanes, Chemical properties of cycloalkanes,	<b>07</b>

	Substitution reactions, Addition reactions, Bayer's strain theory, Sachse-Mohr concept of stainless rings.	
5	<p><b>TYPES OF ORGANIC REACTION</b></p> <p>Homolytic and heterolytic fission, Nucleophiles and electrophiles, curly arrow rules, Reaction intermediates: carbocation, carbanion, free radical, Inductive effect (+I and -I), Types of organic reaction: Addition reaction, Elimination reaction, Substitution reaction, Rearrangement.</p> <p><math>S_N1</math> reaction mechanism, <math>S_N2</math> reaction mechanism, <math>E_1</math> reaction mechanism, <math>E_2</math> reaction mechanism.</p>	06
<b>SECTION-II</b>		
6	<p><b>THERMODYNAMIC</b></p> <p>Definition of thermodynamic term: system, surroundings. Types of systems, Intensive and extensive properties, State and path function and their differential, Thermodynamic processes, Concept of heat and work, First law of thermodynamics : Statement &amp; Mathematical form, Definition of internal energy and enthalpy, Bond dissociation energy and its calculation from thermochemical data, Heat capacity : Heat capacities at constant volume and pressure and their relationship <math>C_p - C_v = R</math>, Joule's law-joule Thomson coefficient and inversion temperature (only definition), Zeroth Law : mathematical treatment of zeroth law and its limitation and various statements of law.</p>	09
7	<p><b>ADSORPTION</b></p> <p>Introduction, Types of adsorption, Freundlich adsorption isotherms and its limitations, Langmuir adsorption isotherms at high &amp; low pressure and its limitations, Uses of adsorption.</p>	06
8	<p><b>MODES OF CONCENTRATION [CONCENTRATION CONCEPT WITH NUMERICALS]</b></p> <p>Preparation of standard solutions, Equivalent weight of acid and base, Equivalent weight of acid salt, Equivalent weight of an ion, Molarity with numerical, Normality with numerical, Molality with numerical, Formality with numerical, Strength of solutions, % concentration w/v, Volume fraction, Weight fraction.</p>	07
9	<p><b>ACIDS AND BASES</b></p> <p>Derivation of hydrolysis constant (<math>k_h</math>), Degree of hydrolysis (<math>h</math>), pH of salt of: Strong acid-weak base, Strong base-weak acid, Weak acid-weak base. Buffers solution- Buffer capacity, Mechanism of acidic and basic buffer solution, Derivation of equation for pH of acidic and basic buffer solution, Numericals- calculation of pH of buffer solutions.</p>	06
<b>LIST OF PRACTICALS: (6 HOURS PER WEEK)</b>		
<b>A. Organic qualitative analysis</b>		
<p>Aim: Determine the organic qualitative analysis Compounds containing one functional group such as phenolic, carboxylic acid, ester, amide, nitro, amine, aldehyde, ketone, alcohol, halogen, anilide, carbohydrate, and hydrocarbon.</p>		

## B. Volumetric analysis

- [1] To prepare a solution of acids and bases with define concentration.
- [2] To prepare a solution by dissolving 'x' gms  $\text{Na}_2\text{CO}_3$  in 100 ml solution and determine its concentration in terms of normality and molarity using given 0.1 N HCl solution.
- [3] To determine the normality, molarity and g/litre of xN NaOH and xN HCl using 0.05M  $\text{Na}_2\text{CO}_3$  solution.
- [4] To determine the molarity, g/litre and normality of each component in a given mixture of xN NaOH and xN  $\text{Na}_2\text{CO}_3$  the using 0.1 M HCl solution.
- [5] To determine the molarity, g/litre and normality of each component in a mixture of xN  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  and xN  $\text{H}_2\text{SO}_4$  using 0.1 N  $\text{KMnO}_4$  and 0.1 N NaOH solution.
- [6] To determine the molarity, g/litre and normality of each component in a mixture of xN  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  and xN  $\text{K}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$  using 0.1 N NaOH and 0.1 N  $\text{KMnO}_4$  solution.

### Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
4. Surprise tests/Quizzes/Tutorials will be conducted.

### Students Learning Outcomes:

At the end of the course the students will be able to:

- **Identify** and correlate the properties of various elements to their periodic properties.
- **Draw** the structures of various metal complexes based on VBT.
- **Identify** the different types of organic reactions
- **Develop** skill in practical hand.
- **Apply** the concept of concentration to prepare solutions of various concentrations.

### Reference Books:

1. Concise Inorganic Chemistry by J.D.Lee, wiley india, 5th edition 2013
2. Textbook of Inorganic Chemistry by Soni P.L., Sultan Chand & Sons. 20th edition 2013
3. Advanced Inorganic Chemistry (3rd Edition) - FA.Cotton and G. Wikinson, Wiley Eastern Pvt.Ltd 6th edition, 2009
4. Advanced Inorganic Chemistry (Volume II) by Prakash Satya, S.Chand & Company Ltd. New Delhi, 2006
5. Organic reaction mechanisms by V.K. Ahluwaliya, Narosa publishing house 4th edition. 2011
6. Advanced Organic Chemistry by Arun Bahl and B.S.Bahl, S.Chand & Company Ltd. New Delhi, 18th edition 2010.
7. Organic Chemistry by Morrison and Boyd, Pearson Education Delhi 7h edition 2011

8. Solomons & Fryhle`s Organic Chemistry by Solomon Graham T.W. and Fryhle Craig B., Wiley India (P) Ltd. New Delhi. 10th edition.
9. A Textbook of Physical Chemistry by P.L.Soni, S.Chand & Company Ltd. New Delhi, 22nd edition 2005.
10. Essentials of Physical Chemistry by Bahl B. S. and Tuli G. D., S.Chand & Company Ltd. New Delhi.
11. Elements of Physical Chemistry by Atkins Peter and Paula Julio, Oxford University Press New Delhi, 6th edition.
12. Analytical Chemistry, Chatwal G. R. and Arora M. Himalaya Publishing House Pvt. Ltd. Mumbai 1st
13. Analytical Chemistry: Theory and Practice. By Verma R. M., CBS Publishers & Distributors New Delhi 3rd edition.
14. Vogel`s Textbook of Quantitative Chemical Analysis by Mendham J. and Denney R. C. Pearson Education Ltd. New Delhi 6th edition.
15. Wastewater Treatment Concepts and Design Approach by Karia G.L. and Christian R.A. 2nd edition



# SYLLABUS


<b>Course Title</b>	<b>MATHEMATICS-I</b>
<b>Course Code</b>	BMT101
<b>Course Credit</b>	Lecture : 4
	Practical : 3
	Tutorial : 0
	Total : 7

## Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
<b>SECTION-I</b>		
1	<b>Indeterminate Forms:</b> L' hospital's rules for various indeterminate forms (Without proof). Various indeterminate forms like $\frac{0}{0}$ form, $\frac{\infty}{\infty}$ form, $0 \times \infty$ form, $\infty - \infty$ form, $1^\infty$ form, $0^0$ form and $\infty^0$ form.	7
2	<b>Successive differentiation:</b> Successive differentiation, Calculation of $n^{th}$ derivative, Some standard results for $n^{th}$ derivatives of $e^{mx}$ , $a^{mx}$ , $\sin(ax + b)$ , $\cos(ax + b)$ , $\log(ax + b)$ , $e^{ax}\sin(bx + c)$ , $e^{ax}\cos(bx + c)$ etc. Leibnitz's Theorem and its examples.	7
3	<b>Mean value theorems:</b> Roll's theorem and problems related to it, Lagrange's mean value theorem and problems related to it, Cauchy's mean value theorem and problems related to it.	7
4	<b>Taylor's theorem, expansions and indeterminate forms:</b> Taylor's theorem (Without proof), Maclaurin's theorem (Without proof), Taylor's and Maclaurin's infinite series expansions, expansions of $e^x$ , $\sin x$ , $\cos x$ , $\tan x$ , $\log(1+x)$ , $\log(1-x)$ under proper conditions.	7
<b>SECTION-II</b>		
5	<b>Polar, spherical &amp; cylindrical co-ordinates:</b> Polar Co-ordinates in $R^2$ , distance between two points in polar Co-ordinates. Polar equations of a straight line, polar equations of circle. Relation between Cartesian and polar coordinates, Relation between Cartesian and spherical coordinates, Relation between Cartesian and cylindrical coordinates.	8
6	<b>Differential Equations of First Order and First Degree:</b> Definition and method of solving of Linear differential equations of first order and first degree, Definition and method of solving of Bernoulli's differential equation and Definition and methods of solving of Exact differential equation.	6
7	<b>Differential equations of first order and higher degree:</b>	8

	Differential equations of first order and first degree solvable for $x$ , solvable for $y$ , solvable for $p$ . Clairaut's form of differential equation and Lagrange's form of differential equations.	
8	<p><b>Reduction Formulae:</b>  Integration of <math>\sin^m x</math> and <math>\cos^m x</math> :  Reduction Formulae for <math>\int \sin^m x dx</math> and <math>\int \cos^m x dx</math>,  Integration of <math>\sin^m x \cdot \cos^n x</math> :  Reduction Formulae for <math>\int \sin^m x \cdot \cos^n x dx</math>, <math>\int \tan^m x dx</math>, <math>\int \cot^m x dx</math>  Where <math>m, n \in N; m, n \geq 2</math>.  Reduction Formulae for <math>\int_0^{\frac{\pi}{2}} \sin^m x dx</math>, <math>\int_0^{\frac{\pi}{2}} \cos^m x dx</math>, <math>\int_0^{\frac{\pi}{2}} \sin^m x \cdot \cos^n x dx</math>  Where <math>m, n \in N; m, n \geq 2</math>.</p>	6
<b>LIST OF PRACTICALS: (6 HOURS PER WEEK)</b>		
<ol style="list-style-type: none"> <li>1. Draw the graph of <math>y = \sin ax</math>, <math>y = \cos ax</math> and <math>y = \tan ax</math>.</li> <li>2. Draw the graph of <math>y = \sec ax</math>, <math>y = \operatorname{cosec} ax</math> and <math>y = \cot ax</math>.</li> <li>3. Draw the graph of <math>y = \sin^{-1} x</math>, <math>y = \cos^{-1} x</math> and <math>y = \tan^{-1} x</math>.</li> <li>4. Draw the graph of <math>y = \sec^{-1} x</math>, <math>y = \operatorname{cosec}^{-1} x</math> and <math>y = \cot^{-1} x</math>.</li> <li>5. Draw the graph of parabola <math>y^2 = 4ax</math>, for <math>a &lt; 0</math> and <math>a &gt; 0</math>.</li> <li>6. Draw the graph of ellipse <math>\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1</math> and hyperbola <math>\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1</math>.</li> <li>7. To solve examples of successive differentiation.</li> <li>8. To solve examples of Mean value Theorem.</li> <li>9. To solve examples by using reduction formula.</li> <li>10. To solve examples by using Bernoulli's Differential Equation.</li> </ol>		
<b>Instructional Method and Pedagogy:</b>		
<ol style="list-style-type: none"> <li>1. Lectures will be conducted with the aid of multi-media projector, black board, Audio/Video clips etc. relevant to the content.</li> <li>2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.</li> <li>3. Surprise tests/Quizzes/Tutorials will be conducted.</li> <li>4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.</li> <li>5. Minimum ten practical's shall be there in the tutorial related to course contents.</li> </ol>		
<b>Students Learning Outcomes:</b>		
<p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> <li>• <b>Understand</b> different coordinate system and relation between them.</li> <li>• <b>Solve</b> differential equation and its application.</li> <li>• <b>Reduce</b> calculation of limit by using different indeterminate form.</li> <li>• <b>Reduce</b> calculation of integration by Reduction formula.</li> </ul>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. The Elements of Co-ordinate Geometry by S. L. Loney, Mac Millan &amp; Co., 1895.</li> </ol>		

2. Elementary Treatise on Co-ordinate Geometry of three dimensions by R. J. T. Bell, Mac Millan & Co., 1920.
3. Integral Calculus by Shanti Narayan, S. Chand Higher Academic, Revised Edition.
4. Differential equations by Shanti Narayan, S. Chand Higher Academic, 10<sup>th</sup> Revised Edition.
5. A Text book of Calculus, S. C. Arora and Ramesh Kumar, Pitamber Publishing Company Ltd., Delhi.
6. Advanced Mathematics, Dr. K. R. Kachot, Mahajan Publishing House, 3<sup>rd</sup> Edition.

		<b>SYLLABUS</b>	
<b>Course Title</b>		<b>PHYSICS-I</b>	
<b>Course Code</b>		BPH101	
<b>Course Credit</b>		Lecture	: 4
		Tutorial	: 0
		Practical	: 3
		Total	: 7
<b>Detailed Syllabus:</b>			
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>		<b>Session Allotted</b>
<b>SECTION-I</b>			
<b>1</b>	<b>Conservation Laws:</b> Review of Newton's laws of motion, Work, Power, Conservation of Force, Kinetic energy-Work-Energy Principle, Potential energy, The law of Conservation of energy, One dimensional Conservative system, Conservation of linear momentum, Centre of Mass, Collision		<b>6</b>
<b>2</b>	<b>Dynamics of Rigid Bodies:</b> Rotational motion (only definition), Torque acting on a particle, Angular momentum, Relation between Torque and Angular momentum, Moment of Inertia, Expressions for Moment of Inertia, Radius of Gyration, Theorems on Moment of Inertia, Moment of Inertia of a Rectangle, Moment of Inertia of Circular ring, Moment of Inertia of Circular disc.		<b>8</b>
<b>3</b>	<b>Gravitation, Gravity and Satellites :</b> Review of Newton's Gravitational law, Gravitations field & Potential, Relation between Gravitational Potential and Field strength, Potential and Field Due to a Solid Sphere, Gravitational Potential Self Energy, Gravitational Self-Energy, Escape Velocity, Kepler's Laws of Planetary Motion, Proof of Kepler's Laws, Satellites, Time Period of Satellite, State of Weightlessness.		<b>8</b>
<b>4</b>	<b>Elasticity:</b> Introduction, Stress and strain, Hooke's Law (only definition), Young's Modulus, Bulk Modulus, Modulus of Rigidity, Poisson's Ratio, Equivalence of Shear to Compression & Extension (7.8), Relation between Y, K, $\eta$ & $\sigma$ , Determination of Young's Modulus by Searle's Method.		<b>6</b>
<b>SECTION-II</b>			
<b>5</b>	<b>D.C.Circuits &amp; A.C.Circuits:</b> Growth and decay of current in L-R circuit with D.C.source. Charge and discharge of R-C. circuit with D.C. source,		<b>8</b>



	A.C.Circuits: Review of Alternating currents, Cycle, Frequency, Phase, R.M.S value of Alternating currents, L-C-R series A.C.source, L-C-R series resonance, Parallel resonance.	
6	<b>Network Theorems &amp; Multimeter :</b> Constant voltage source, Constant current source, Maximum power transfer theorem, Thevenin's theorem, Norton's theorem, Chassis and ground, Multimeter.	6
7	<b>Structure of The Atom:</b> Failure of Classical Mechanics, Effect of Nuclear Motion on Atomic Spectra, Correspondence Principle, Critical Potentials, Atomic Excitation, Vector Model, Quantum numbers (only definitions).	6
8	<b>Wave Mechanics:</b> De'Broglie wavelength & Phase velocity of De'Broglie's wave, Expression for group velocity, Group velocity of de Broglie's wave, Relation between Phase velocity & Group velocity, Heisenberg's Uncertainty Principle (only), wave mechanical atom model.	8

#### LIST OF PRACTICALS: (6 HOURS PER WEEK)

1. Study of errors in observation
2. Bar Pendulum : Determination of 'K' and 'g'
3. Torsion pendulum. (Moment of Inertia of disc & Modulus of rigidity)
4. Young's Modulus of long wire by Searl's method
5. Poisson's ratio of rubber tube
6. Newton's law of cooling and specific heat of liquid.
7. Discharge of Capacitor and RC time constant
8. Verification of Maximum power transfer theorem. (using PCB)
9. Tangent galvanometer (Constant of T.G. & Verification of Ohm's law)
10. Low resistance by Potentiometer

#### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Tutorials will be conducted.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Approximately ten experiments shall be there in the laboratory related to course contents.

#### Students Learning Outcomes:

On the successful completion of the course, students will be able to:

- Understand the concepts and applications of Conservation Laws, Dynamics of Rigid Bodies, Gravitation, Gravity and Satellites, Elasticity, D.C.Circuits & A.C.Circuits, Network Theorems & Multimeter, Structure of The Atom, Wave Mechanics.
- Perform practical of mechanics and circuit.
- Operate the equipments and calculate different physical quantities.
- Draw the conclusion of the result of Experiments.

#### Reference Books:

- Engineering Physics by R.K.Gaur, S.L.Gupta, Dhanpat Rai Publications.
- Principles of Electronics by V.K.Mehta & Rohit Mehta., S.Chand Company.
- Modern Physics by R.Murugesan & Kiruthiga Sivaprasath, S.Chand Comp.

- Waves and Oscillations by Brij Lal and Subrahmaniam. S.Chand comp.



# SYLLABUS

<b>Course Title</b>		<b>ENGLISH AS SECOND LANGUAGE - BEGINNER LEVEL-I</b>		
<b>Course Code</b>		ESL102		
<b>Course Credit</b>		Lecture	: 03	
		Tutorial	: 00	
		Practical	: 00	
		Total	: 03	
<b>Detailed Syllabus:</b>				
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>			
<b>Unit No.</b>	<b>Context</b>	<b>Topics</b>	<b>Learning objectives</b>	<b>Session Allotted</b>
<b>SECTION-I</b>				
<b>1</b>	Social	VOCAB HOUSIE	Students will be able to enhance their language by learning various vocabularies related to family & relations, seasons, food, restaurants and its type, shopping, festivals and occasions, common ailments and using them in day to day conversation.	<b>22</b>
<b>2</b>	Social/Professional	LISTEN & LEARN	Students will get exposure to listen to audios based on making inquiry, bookings & reservations, complaints, ordering food, conversation on leisure time activities and movie reviews. They will further be able to construct their own short conversations on all of the above.	
<b>3</b>	Social	GIVING DIRECTIONS	Students will be able to understand and express different ways of giving directions by appropriate usage of prepositions.	

4	Social/Professional/Academic	DESCRIBING PEOPLE, PLACE & INSTANCES	Students will get an opportunity to identify personality traits, adjectives related to describing people, places and instances. Further they will showcase their understanding in various contexts.	
<b>SECTION-II</b>				
5	Social/Professional/Academic	TELEPHONING	Students will learn and use phrases that are used in telephoning in different contexts like making inquiry, appointment, request, ordering food. They will be able to demonstrate their learning using appropriate model of conversation.	<b>23</b>
6	Social/Academic	IDIOMS & PHRASES	Students will be able to explain literal and figurative meaning of idioms and will use them in daily life conversation.	
7	Academic/Professional	READING	Students will get exposure of reading strategies like skimming & scanning and thus, will be able to comprehend the text, informative charts, graphs and tabular representations.	
8	Academic	WRITING EMAILS	Students will be able to compose emails regarding application, permission, complaint, apology & compliment using the phrases suitable in each context.	

**Students Learning Outcomes:**

At end of the course, students will:

- Understand variety of academic, social and professional conversations.
- Speak on a variety of topics in academic, social and professional contexts.
- Read and understand language in academic, social and professional contexts.
- Write and express ideas in routine academic, social and professional contexts.