



# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS01MJCHE1: General Chemistry-I

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc.(Chemistry)
Semester	I
Course Code	BS01MJCHE1
Course Title	General Chemistry-I
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. To review the basics concepts of atomic structure that has direct relevance to the fundamental concepts of organic chemistry. This material is essential to the understanding of organic molecular structure and, later on, reaction mechanisms.
2. The study of chemists is always interested in identifying and knowing how the chemical transformation occurs. It plays an essential role in science and plays a central role in daily life activities.
3. Understand that elements are placed on the periodic table due to similar properties. Identify a period and a group on the periodic table.
4. Be able to recognize, classify, explain, and apply fundamental organic reactions.







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## School of Science B.Sc. (Chemistry) Programme

### Learning Outcomes

On the Completion of this course, students will able to:

1. Understand the concepts of mole, molarity, mole fraction, molecular weight and so forth.
2. Calculate percentage ratios of weight average, volume average and limiting values of the reagents which are present in the reactions.
3. Students can understand electronic configuration of elements, shape of orbitals, nodes and nodal plane.
4. Students can write IUPAC nomenclature of organic compounds.
5. Recognize electronic displacements, reaction intermediate and its stability as well as different types of organic reactions.

### Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Basic of Concepts of Chemistry</b> <ul style="list-style-type: none"><li>➤ Atomic Weight , Molecular Weight , Average Molecular Weight ,Concept of Mole</li><li>➤ Molarity, Normality, Molality, % W/W , % V/V , Mole Fraction, ppm</li><li>➤ Limiting Reagent, Numerical</li><li>➤ Determination of Molecular Formula Empirical formula, Numerical</li></ul>	15
II	<b>Structure and properties of atoms</b> <ul style="list-style-type: none"><li>➤ Introduction to development of the structure of atom</li><li>➤ Basic concept of Wave particle duality of electron, De-Broglie's equation, Heisenberg's uncertainty principle and its Numerical</li><li>➤ Example based on de-Broglie's equation, Heisenberg's uncertainty principle</li><li>➤ Shape of orbitals, nodes, nodal plane</li><li>➤ Aufbau rule, Pauli's Principle, and Hund's rule for electronic configuration, stability of half-filled and completely filled orbitals</li></ul>	15











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## School of Science B.Sc. (Chemistry) Programme

### Reference Books

1. Inorganic Chemistry - J. N. Gurtu & H. C. Khera
2. Principles of Inorganic chemistry- B. R. Puri, L. R. Sharma and K. C. Kalia; Vallabh publications, Delhi.
3. Coordination chemistry-Ajai Kumar ; Aaryush Education, U.P.
4. Basic Inorganic Chemistry – Gurdeep & Chatwal.
5. Undergraduate Organic Chemistry, Vol-1, Jagdamba Singh, L. D.S. Yadav, Pragati Prakashan, 8th edition-2013
6. Organic Reaction Mechanism, including Reaction Intermediates, V. K. Ahluwalia
7. Organic Chemistry by Morrison and Boyd.
8. Essentials of Physical Chemistry, B. S. Bahl, G. D. Tuli and Arun Bahl, S. Chand & Co.
9. Elements of Physical Chemistry, B. R. Puri, L. R. Sharma and Madan Pathania, Vishal Publishing Co. Jalandhar.
10. Physical Chemistry, B. K. Sharma, Goel Publication House. Meerut.
11. Physical Chemistry, 7th edition P. C. Rakshit

**L::** Lecture, **T::** Tutorial , **P::**Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







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## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS01MJCHE2: General Chemistry-II

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01MJCHE2
Course Title	General Chemistry-II
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. Understand that elements are placed on the periodic table due to similar properties. Identify a period and a group on the periodic table.
2. Get information about energy level diagram of diatomic molecules.
3. To write IUPAC nomenclature of alkyl halides.
4. To understand different nucleophilic substitution reactions.

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Students can understand electronic configuration of elements, shape of orbitals, nodes and nodal plane.
2. Calculate bond order and magnetic properties by the help of energy level diagram.
3. Get information about how nucleophilic reactions can occur.
4. Understand about different name reactions.
5. Get information about polyhalogen compounds, their properties and uses.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Periodicity</b> <ul style="list-style-type: none"><li>➤ Study of modern periodic table, electronic configuration in periodic table, Periodicity in atomic properties and its causes, Magic number</li><li>➤ Explanation of general trends of periodic properties<ul style="list-style-type: none"><li>(1) Atomic radii (covalent, metallic and van der Waals radii)</li><li>(2) Calculation of Ionic radii by Pauling method</li><li>(3) Ionization potential</li><li>(4) Electron gain enthalpy</li><li>(5) Electronegativity</li></ul></li><li>➤ Calculation of Electronegativity by Mulliken and Pauling method.</li><li>➤ Periodic Trends in Chemical Properties,<ul style="list-style-type: none"><li>(a) Periodicity of Valence or Oxidation States</li><li>(b) Anomalous Properties of Second Period Elements, Periodic Trends and Chemical Reactivity</li></ul></li></ul>	15
II	<b>Aliphatic Hydrocarbons-I and alkyl halides</b> <ul style="list-style-type: none"><li>➤ IUPAC Nomenclature of alkyl halide</li><li>➤ Free radical substitutions reactions</li><li>➤ Preparation of alkyl halides</li><li>➤ Alkanes: Formation of alkanes by Wurtz reaction, Wurtz-Fittig, Grignard, fitting reaction</li><li>➤ Only Introduction of two types (<math>SN^1</math> &amp; <math>SN^2</math>) of mechanism and difference between <math>SN^1</math> &amp; <math>SN^2</math></li><li>➤ Poly halogen, hydrocarbon and its application</li></ul>	15







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III	<b>Chemical bonding</b> <ul style="list-style-type: none"><li>➤ Basics of Covalent bond, Ionic bond, Co-ordinate covalent bond and H- bonding</li><li>➤ octet rule and its limitation</li><li>➤ Lewis Structure, Bond Length, Bond order, Bond Angle Geometry and its shapes of Molecule</li><li>➤ Valence bond theory and its limitations</li><li>➤ Sidgwick Powell rule and VSEPR theory,</li><li>➤ Concept of hybridization: <math>SP</math>, <math>SP^2</math>, <math>SP^3</math>, <math>SP^3d</math> &amp; <math>SP^3d^2</math></li><li>➤ MO theory and its application</li><li>➤ Energy level diagrams of <math>B_2</math>, <math>C_2</math>, <math>N_2</math>, <math>O_2</math>, <math>F_2</math>, <math>CO</math>, and <math>NO</math> calculation of bond order and magnetic properties.</li></ul>	15
<b>Unit – IV Practical(s)</b>		<b>30 Hours</b>
<b>Qualitative analysis of inorganic salts</b> (Minimum 08 salts-containing two radicals) Inorganic salts containing anion (chloride, bromide iodide, nitrate, nitrite, sulphate, sulphite, sulphide, carbonate, phosphate (soluble & insoluble), oxide, chromate, and dichromate)		
<b>Reference Books</b>		
<ol style="list-style-type: none"><li>1. Principles of Inorganic chemistry- B. R. Puri, L. R. Sharma and K. C. Kalia; Vallabh publications, Delhi.</li><li>2. Coordination chemistry-Ajai Kumar ; Aaryush Education, U.P.</li><li>3. Inorganic Chemistry - J. N. Gurtu &amp; H. C. Khera</li><li>4. Basic Inorganic Chemistry – Gurdeep &amp; Chatwal.</li><li>5. Organic Chemistry, Vol-1, Jagdamba Singh, L. D.S. Yadav, Pragati Prakashan, 8th edition-2013</li><li>6. Organic Chemistry by Morrison and Boyd.</li><li>7. Organic Reaction Mechanism, including Reaction Intermediates, V. K. Ahluwalia</li><li>8. Essentials of Physical Chemistry, B. S. Bahl, G. D. Tuli and Arun Bahl, S. Chand &amp; Co.</li><li>9. Elements of Physical Chemistry, B. R. Puri, L. R. Sharma and Madan Pathania, Vishal Publishing Co. Jalandhar.</li><li>10. Physical Chemistry, B. K. Sharma, Goel Publication House. Meerut.</li><li>11. Physical Chemistry, 7th edition P. C. Rakshit</li></ol>		







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## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS01MICHE1 : Basic Concepts of Zoology-I

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01MICHE1
Course Title	Basic Concepts of Zoology-I
Course Content Type (Th./Pr.)	Theory + Practical
Course Credit	3 + 1
Sessions+ Lab. Per Week	3 + 2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

The student develop an understanding of taxonomy of non-chordates from Protist to Echinodermata, and understands the complex interactions of different living organisms.

#### Prerequisites (if any)

- Student must know about different strata and hierarchy of taxonomy.
- Student must aware about specific terms used for animal cell biology and genetics.

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Students will able to learn about the taxonomy and diversity of different phylum of non-chordate animals.
2. Students will learn about structure and functions of animal cell and cell organelles.
3. Students will learn about basic concepts of Mendelian genetics.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Fundamentals of classification:</b> <ul style="list-style-type: none"><li>Scheme of classification of Non-chordates</li><li>General characters of Phyla: Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca and Echinodermata.</li><li>Suitable examples ( as per Practical Syllabus)</li></ul>	15
II	<b>Basic Cell Biology: Cell, Cell Organelles and Microscopy</b> <ul style="list-style-type: none"><li>Ultra-structure of a typical Animal cell following organelles:</li><li>Nucleus</li><li>Mitochondria</li><li>Endoplasmic reticulum</li><li>Eukaryotic Ribosome</li><li>Light Microscopes: (i) Simple (ii) Compound</li></ul>	15
III	<b>Genetics: Mendelian and Non-mendelian inheritance:</b> <ul style="list-style-type: none"><li>Introduction to Genetics and gene</li><li>Mendel's Monohybrid ( 1:2:1 ) and</li><li>Di - hybrid cross ( 9:3:3:1 ).</li><li>Incomplete dominance ( 4 O'clock plant - 1:2:1 )</li><li>Co - dominance (Coat color in Cattle - 1:2:1 )</li><li>Multiple alleles ABO Blood groups</li><li>Polygenic inheritance (Skin color in humans - 1:4:6:4:1 )</li><li>Lethal Genes : Coat color in Rat</li></ul>	15







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## School of Science B.Sc. (Chemistry) Programme

### Unit – IV Practical(s)

30 Hours

1. Study of general characters of phylum protozoa and examples using laboratory slides, charts and specimens; Amoeba, Paramecium and Euglena.
2. Study of general characters of phylum Porifera and examples using laboratory slides, charts and specimens; Leucosolenia, Euspongiaea, and slides of sponge spicules
3. Study of general characters of phylum Coelenterata and Platyhelminthes and examples using laboratory slides, charts and specimens; Obelia, Aurelia, Sea anemone, Planaria, Liver fluke and Tape worm.
4. Study of general characters of phylum Nematoda and examples using laboratory slides, charts and specimens; Ascaris and Enterobius
5. Study of general characters of phylum Arthropoda and examples using laboratory slides, charts and specimens; Scorpion, Crab.
6. Study of general characters of phylum Mollusca and examples using laboratory slides, charts and specimens; Chiton, Dentalium, Pila, Unio, Octopus.
7. Study of general characters of phylum Echinodermata and examples using laboratory slides, charts and specimens; Star Fish, Brittle Star, Sea Cucumber, Feather Star.
8. Study of Cytology:
  - (i) Typical Animal cell
  - (ii) Nucleus
  - (iii) Mitochondria
  - (iv) Endoplasmic Reticulum
  - (v) Eukaryotic Ribosomes
9. Study of Light Microscopes: (i) simple (ii) compound
10. Study of Genetics:
  - (i) Monohybrid Ratio 3 : 1
  - (ii) Di - hybrid Ratio 9 : 3 : 3 : 1
  - (iii) In complete dominance 1 : 2 : 1
  - (iv) Co - dominance (1:2:1)
  - (v) Multiple Alleles - ABO Blood groups
  - (vi) Polygenic inheritance 1 : 4 : 6 : 4 : 1 (skin color in man)
  - (vii) Lethal genes-Coat Color in Rat 2 : 1







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## School of Science B.Sc. (Chemistry) Programme

### Text Book(s)

1. Invertebrate Zoology by R. L. Kotpal Rastogi Publications, Meerut- New Delhi
2. Cytology by P. K. Gupta., S Chand & Co. Delhi
3. Fundamentals of Genetics by B. D. Singh. Medtech Science Press

### Reference Books

1. Invertebrate Zoology by Jordan, E. L. and Verma, P.S, S. Chand & Co. New Delhi
2. Invertebrate Zoology by Dhami, P.S. and Dhami, J. K., S Chand & Co. Delhi
3. Cell Biology and Molecular Biology by N. Arumugan, Saras Publications.
4. Genetics by P.S. Verma & V.K. Agarwal, S. Chand & Co. Delhi.
5. A Manual of Zoology Vol. I & II, by Ayyar and Ananthakrishnan and Viswanthan
6. Biology of the Invertebrates by J. A. Pechenik,
7. Fundamental of Light Microscopy & Electron Imaging. Murphy D.B., Wiley Liss

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**PWE::** Practical Work Examination

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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS01MICHE2 Basics of Electromagnetism

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5%	12.5%	37.5%	12.5%

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01MICHE2
Course Title	Basics of Electromagnetism
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours+ 30 Practical Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

Students will able to study

1. Difference between vector and scalar quantity, scalar and vector product, Differential Calculus & Integral Calculus and its application.
2. The basic mathematical tools to solve the various electromagnetic problems also able to learn vector and scalar fields and various functions & operators.
3. To realize the importance of electricity and magnetism in real world.
4. Learn and revise the concept of electrostatics- Coulomb's law, Gauss's law and its application, Electric Potential and its relation with electric field etc.
5. Revise and study the basics of magnetostatics, Orestead's observation, magnetism and matter (Diamagnetism, Paramagnetism, Ferromagnetism), Ampere's law, Faraday's Law and its applications, Lenz law etc.

### Prerequisites (if any)

12<sup>th</sup> Science passed with Physics subject.







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### School of Science

### B.Sc. (Chemistry) Programme

#### Learning Outcomes

On the Completion of this course, students will able to:

1. The Student will get the overview of core concepts in the field of electricity and magnetism.
2. Able to apply the theoretical knowledge of these fields to analyze and solve the problems of day to day life.
3. Learn the basic necessary mathematics tools to solve electromagnetism problems.

#### Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Basic Vector Calculus:</b> <ul style="list-style-type: none"><li>➤ Types of Vectors, Vector addition, Vector subtraction, Unit vector, Dot or Scalar Products, Cross or Vector Products, Triple Product, reciprocal sets of vectors.</li><li>➤ Partial differentiation of Vectors, Differentiability and Continuity</li><li>➤ The vector differential operator <math>\nabla</math>, the gradient, the divergence and curl, Formulae involving <math>\nabla</math>. Invariance, Line integral, Surface integral, Volume Integral</li><li>➤ The divergence theorem of Gauss, Stokes' theorem, Green's theorem, integral operator form <math>\nabla</math> (Theorem statements only) (Discussion on Related Problems)</li></ul>	15
II	<b>Electrostatics:</b> <ul style="list-style-type: none"><li>➤ Coulomb's law, What is field, The Electric Field, Electric field of point charges, Electric Field of a point charges, Electric field due to continuous charge distributions, Electric field lines, A point charge in an electric field.</li><li>➤ What is Gauss's law all about?, The flux of a vector field, The flux of electric field, Gauss law, Applications of Gauss law, Gauss law and conductors, Experimental tests of Gauss's law and Coulomb's Law</li><li>➤ Potential energy, Electrical Potential energy, Electrical potential, Calculating potential from Field, Potential due to point charges, Equipotential Surfaces</li><li>➤ Analysis of circuits, RC Circuits</li><li>➤ Electric Field Strength, Electric Polarisation, Electric Displacement Vector, Three Electric Vectors <math>D</math> and <math>P</math> in terms of <math>E</math>, Concept of Capacitance (Discussion on Related Problems)</li></ul>	15







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III	<b>Magnetism</b> <ul style="list-style-type: none"><li>➤ Lorentz force, Biot Savart Law, Magnetic field on the axis of a circular current loop, Ampere's Circuital law, The Solenoid, Magnetic Force between two current carrying conductors, Torque on current loop, magnetic dipole, circular loop as a magnetic dipole, moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter</li><li>➤ Analogy between Biot Savart's law and Coulomb's law, Magnetization and Magnetic intensity, Magnetic properties of matter (Diamagnetism, Paramagnetism, Ferromagnetism including Curie law and Hysteresis)</li><li>➤ Orestead's Observation, Faraday's Experiments on electromagnetic induction, Faraday's Law of induction, Lenz Law (Discussion on Related Problems)</li></ul>	15
<b>Unit-IV-Practical(s)</b>		<b>(30)</b>
<ol style="list-style-type: none"><li>1. Study the measurements and error analysis using Vernier Callipers and Micrometer Screw gauge.</li><li>2. Study the various types of graph Plotting.</li><li>3. Least square fitting using given linear data.</li><li>4. Conversion of galvanometer into ammeter.</li><li>5. Conversion of galvanometer into voltmeter.</li><li>6. To determine the decay constant and time constant using RC circuit.</li><li>7. Verification of Stefan's Fourth power law.</li><li>8. Calibration of Spectrometer using Schuster's method.</li></ol>		
<b>Text Book(s)</b>		
<ol style="list-style-type: none"><li>1. Unit 1: Vector analysis by Murray Spiegel, Schaum's Outline 2<sup>nd</sup> Edition.</li><li>2. Unit 2: (i) Physics by Halliday, Resnick and Krane, Volume-2, 5<sup>th</sup> Edition, Willey Publication. (ii) Essentials of Electromagnetism by Matthew N. O. Sadiku, 7<sup>th</sup> Edition, Oxford Press.</li><li>3. Unit 3: B.Sc. First Year -Electricity and Magnetism, BSCPH-102, Uttarakhand Open Uni.</li></ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"><li>1. Electricity and Magnetism by D.C.Tayal, Himalaya Publishing House</li><li>2. Introduction to Electromagnetism by David J. Griffiths, Pearson Publication</li><li>3. Electricity and Magnetism by Satyapraksah, Meerut Publication</li><li>4. Electricity and Magnetism by Sehgal, Chopra, S.Chand Publication, New Delhi</li></ol>		







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### Web Resources

1. <https://phys.libretexts.org>
2. <https://www.youtube.com/watch?v=5JZjEmJqtus>
3. <https://www.youtube.com/watch?v=8zKTFwIzXhM>
4. <https://archive.nptel.ac.in/courses/115/104/115104088/>
5. <https://archive.nptel.ac.in/courses/115/101/115101005/>

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**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS01MICHE3 Mathematics-I

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5%	12.5%	37.5%	12.5%

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01MICHE3
Course Title	Mathematics-I
Course Content Type(Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours+ 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

Students will able to study

1. Understanding the concept of differentiation and its applications.
2. Developing the ability to find derivatives of various functions using differentiation rules.
3. Exploring higher-order derivatives and their interpretations.
4. Utilizing differentiation techniques such as the chain rule, product rule, and quotient rule.
5. Understanding the concept of integration and its applications.
6. Developing the ability to find anti - derivatives and definite integrals.
7. Exploring techniques of integration such as substitution, integration by parts, and partial fractions.
8. Eigen values represent scalar values associated with a matrix, and eigenvectors are corresponding vectors.
9. By understanding and applying basic matrix algebra, we can solve a wide range of mathematical problems, analyze data, perform transformations, and model real-world phenomena.

#### Prerequisites (if any)

12<sup>th</sup> Science passed with Mathematics as a subject.







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## School of Science B.Sc. (Chemistry) Programme

### Learning Outcomes

On the Completion of this course, students will able to:

1. Use Leibnitz's rule to evaluate derivatives of higher order, able to study the geometry of various types of functions, evaluate the area when studying Integration. The level of depth and complexity of these topics can vary depending on the educational level and the specific course being taken.
2. Perform Basic Matrix Operations, Multiply Matrices; Find the Inverse of a Matrix, Solve Systems of Linear Equations, Compute Determinants, Diagonalizable Matrices and Students will have a conceptual understanding of how matrices can represent transformations such as rotations, scaling, shearing, and reflections.

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Revision of algebra of derivatives and its standard forms, Successive Derivatives, standard results for derivative, Leibniz's Theorem and examples based on it. Definition of limit of a sequence, Convergence and divergence of an infinite series, Comparison test, Ratio test, Root test, Radius and interval of convergence of power series.	15
II	Revision of algebra of integration and its standard forms, Reduction Formulae for $\int \sin^n x \, dx$ , $\int \cos^n x \, dx$ , $\int \sin^m x \cos^n x \, dx$ and $\int_0^{\pi/2} \sin^n x \, dx$ , $\int_0^{\pi/2} \cos^n x \, dx$ , $\int_0^{\pi/2} \sin^m x \cos^n x \, dx$ where $m, n \in \mathbb{N}$ , with $m, n \geq 2$ Mean value theorems: Rolle's theorem, Lagrange's and Cauchy's theorem. and Taylor's theorem(without proof). Expansion in power series of $\sin x$ , $\cos x$ , $\log(1+x)$ , $e^x$ and $(1+x)^m$ in appropriate domain, L'Hospital's rule and it's numerical.	15







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## School of Science B.Sc. (Chemistry) Programme

III	Matrices: matrix operations (Addition, Scalar Multiplication, Multiplication, Transpose, Adjoin and their properties); Special types of matrices: Null, Identity, Diagonal, Triangular, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary, Normal, Idempotent, Nilpotent, Involuntary, Algebra of determinants and its properties, Solution of the matrix Equation $AX = B$ ; Row reduced Echelon form of matrix and Matrix inversion using it, Linear dependence and independence of rows and columns of a matrix. Row rank, column rank and rank of a matrix. Equivalence of row rank and column rank of matrix. Eigen values, eigenvectors and the characteristics equation of a matrix. Cayley- Hamilton theorem and its use in finding inverse of a matrix. Application of matrices to a system of a linear equation. Theorems on system of consistency of linear equations, solution of system of linear equation in three variables by Cramer's rule.	15
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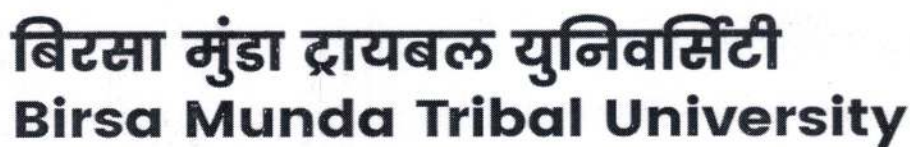
### Unit – IV Practical(s)

30 Hours

1. Problems solving based on Limit using definition.
2. Problems solving based on Derivative using first principle.
3. Problems solving based on L-hospital rule first and second kind.
4. Problems solving based on Extreme values of function using differentiation.
5. Problems solving based on Integration by parts of definite integral.
6. Problems solving based on  $\int_0^{\pi/2} \sin^n x \, dx$ ,  $\int_0^{\pi/2} \cos^n x \, dx$ .
7. Problems solving based on  $\int_0^{\pi/2} \sin^m x \cos^n x \, dx$ .
8. Problems solving based on Properties of Inverse of matrix.
9. Problems solving based on rank of a matrix.
10. Problems solving based on Matrix represent as sum of Symmetric & Skew-Symmetric matrix
11. Problems solving based on Find solution of system of linear equation using Cramer's rule.
12. Problems solving based on Eigen values & Eigenvectors.
13. Problems solving based on verification of Cayley- Hamilton theorem.
14. Problems solving based on Inverse of matrix using Cayley- Hamilton theorem.







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**School of Science**  
**B.Sc. (Chemistry) Programme**

1. Calculus - Dr. Elliot Mendel son, Mc GrawHill Book co.
2. Calculus - Thomas and Finney , Pearson Education , Asian edition
3. Calculus and Analytic Geometry - G. B. Thomas and R. L. Finney. Pearson Education. Indian Reprint.
4. Mathematical Physics.- H.K.Dass. S.Chand.

1. Differential Calculus by Shanti Narayan & Differential Calculus by Gorakh Prasad
2. Higher Algebra by Barnard S. and Child J. M.
3. Higher Algebra by H. S. Hall and S. R. Knight H. M.
4. Integral Calculus by Shanti Narayan & Integral Calculus by Gorakh Prasad
5. Mathematical sciences (UGC CSIR) by Pawan Sharma, Neha Sharma and Suraj singh. (Arihant publication India)

1. <https://archive.nptel.ac.in/courses/111/105/111105121/>
2. <https://math.libretexts.org/>
3. <https://archive.nptel.ac.in/courses/111/108/111108157/>

## CCE:: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

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## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code& Name:** - BS01MDCHE1: Ecosystem and Natural Resources

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5%	12.5%	37.5%	12.5%

<b>Programme Name</b>	B.Sc. (Chemistry)
<b>Semester</b>	I
<b>Course Code</b>	BS01MDCHE1
<b>Course Title</b>	Ecosystem and Natural Resources
<b>Course Content Type (Th./Pr.)</b>	Theory
<b>Course Credit</b>	3+1
<b>Sessions+ Lab. Per Week</b>	3+2
<b>Total Teaching/Lab. Hours</b>	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. This a unique undergraduate course designed to provide students with a fundamental understanding of ecological principles as applied to current natural resources and its management. This course arms students with the essential knowledge to tackle natural resources challenges in a changing world.

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

1. To understand the basic concepts of environmental studies and natural resources.
2. To learn about the various eco-systems of nature.
3. To gain knowledge about different types of environmental pollutions and their control measures.
4. To acquire the knowledge about the various social aspects related to the environment.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Fundamentals Ecosystems:</b> <ul style="list-style-type: none"><li>• Introduction</li><li>• Concept and types of ecosystem,</li><li>• Structure and functioning of an Ecosystem.</li><li>• Food chains, food webs and ecological pyramids</li><li>• Energy flow in an ecosystem through Food Chain.</li><li>• Primary Production and Secondary Production.</li><li>• Ecosystem Regulation</li><li>• Ecological Succession</li><li>• Major Components of Ecosystems and Balance in Nature.</li><li>• Terrestrial Ecosystems: Forests, Grasslands and Deserts.</li><li>• Aquatic Ecosystem: Fresh Water, Coastal Water and Marine Water.</li></ul>	15
II	<b>Natural Resources:</b> <ul style="list-style-type: none"><li>• Introduction.</li><li>• Forest Resources (Narmada District).</li><li>• Water Resources.</li><li>• Energy Resources.</li><li>• Land Resources.</li><li>• Role of an Individual in Conservation of Natural Resources.</li><li>• Equitable Use of Resources for Sustainable Lifestyles.</li><li>• Environmental Implications of Non-conventional Sources of Energy.</li><li>• Role of Government In conservation of natural Resources.</li></ul>	15





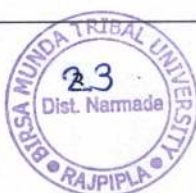


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## School of Science B.Sc. (Chemistry) Programme

III	<b>Environmental Pollution:</b> <ul style="list-style-type: none"><li>• Introduction</li><li>• Air Pollution, Sources of Air Pollution and Air Pollutants, Methods to Control Air Pollution.</li><li>• Acid Rain.</li><li>• Smog: Sulphur, Photochemical and Industrial.</li><li>• Ozone layer depletion.</li><li>• Water Pollution.</li><li>• Soil Pollution and Soil Conservation.</li><li>• Noise Pollution.</li><li>• Thermal Pollution.</li><li>• Marine Pollution.</li><li>• Nuclear Hazards.</li><li>• Solid Waste Management.</li></ul>	15
<b>Unit – IV Practical(s)</b>		<b>30 Hours</b>
<ol style="list-style-type: none"><li>1. To study the detritus and grazing food chain.</li><li>2. To study bottom-up and top-down control of community structure in through food web.</li><li>3. To study energy, numbers and biomass ecological pyramids.</li><li>4. To study the ecological succession and their types with examples.</li><li>5. To study types of terrestrial ecosystem.</li><li>6. To study types of aquatic ecosystem.</li><li>7. To study the forest resources in context of Indian forests.</li><li>8. To study hazardous pollutant in water and their adverse effects on health.</li><li>9. To study the sewage treatment plants its mechanism.</li><li>10. To study the eutrophic conditions in water bodies.</li></ol>		
<b>Text Book(s)</b>		
<ol style="list-style-type: none"><li>1. Environmental Studies by Benny Joseph Tata McGraw Hill Publishing Co. Ltd.</li><li>2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Hyderabad, Universities Press</li></ol>		







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## School of Science B.Sc. (Chemistry) Programme

### Reference Books

1. Textbook of Environmental Sciences and Technology by Anji Reddy, Hyderabad.
2. Introduction to Environmental Sciences by Y. Anjaneyulu, BS Publications.
3. Fundamentals of Ecology by Odum E.P., Saunders, Philadelphia.
4. Ecology and Ecosystem Conservation by Schmitz O. J., Island Press, Washington, DC

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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS01MDCHE2: Physical Optics & Modern Physics

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5%	12.5%	37.5%	12.5%

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01MDCHE2
Course Title	Physical Optics & Modern Physics
Course Content Type(Th./Pr.)	Theory + Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. Students will be able to learn various phenomenon of light, focal length of thin lens, thin film interference, Newton's ring formation and wedge shape interference.
2. Learn about X-ray production, Bragg's formula, X-ray characteristics and X-ray uses in real world application, Compton effect and pair production.

### Prerequisites (if any)

12<sup>th</sup> Science passed with Physics subject.

### Learning Outcomes

On the Completion of this course, students will be able to:

1. The Student will get the overview of core concepts in the field of electricity and magnetism.
2. Able to apply the theoretical knowledge of these fields to analyze and solve the problems of day to day life.
3. Learn the basic necessary mathematics tools to solve electromagnetism problems.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Light</b> <ul style="list-style-type: none"><li>➤ Huygen's Principle, Properties of Light, Refractive index, Optical Path, Fermat's Principle of least time,</li><li>➤ Deviation by a thin lens, Power, Equivalent focal length of two lenses, Cardinal Points, Cardinal points of a coaxial system of two thin lenses –focal length of the system</li><li>➤ Thick lens equation, Combination of two thick lenses – Extended object at infinity, Application of lens combination (Topics relevant problems)</li></ul>	15
II	<b>Interference in Thin films</b> <ul style="list-style-type: none"><li>➤ Review of interference: introduction, Young's experiment, coherence, conditions for interference, Interference in thin films, interference due to reflected light (thin films), interference due to transmitted light(thin film), fringes produced by a wedge shaped thin film, Newton's rings, determination of wavelength of Sodium light using Newton's ring. (Topics relevant problems)</li></ul>	15
III	<b>X-Rays</b> <ul style="list-style-type: none"><li>➤ Black body radiation, Photo electric effect, What is light, X-Rays, X-Ray production, X-Rays Characteristics, X-Ray Diffraction, Compton effect, Pair Production, photons and Gravity</li></ul>	15

### Unit-IV-Practical(s)

(30)

1.  $\eta$  by dynamic method
2. M.I. of Disc using Torsional pendulum.
3. Prove the parallel axis theorem.
4. Prove the perpendicular axis theorem.
5. Determination of "g" using Bar Pendulum.
6. Newton's ring
7. Poisson's ratio of a rubber.
8. Cardinal Points of the lens system.







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## School of Science B.Sc. (Chemistry) Programme

### Text Book(s)

1. Unit 1 & 2: A text book of Optics by Brijlal & Subramaniam, 23<sup>rd</sup> Edition, S. Chand Publication
2. Unit 3 : Concepts of Physics by Arthur Beiser, Willey Publication

### Reference Books

1. Modern Physics by Kenneth S. Krane, 3<sup>rd</sup> Edition, John Wiley & Sons, INC.
2. Modern Physics by Murugesan, 18<sup>th</sup> Edition, S.Chand.
3. Modern Physics by Paul A. Tipler, Ralph A. Llewellyn, W. H. Freeman and Company, New York.
4. Principle of Optics by B.K. Mathur, Gopal Printing
5. Optics by Ajoy Ghatak, Mc. Graw Hill
6. B.Sc. Practical Physics by Harnam Singh and Dr. P.S. Hemne, S. Chand & Co. Ltd., New Delhi (2000).
7. An Advanced Course in Practical Physics by D. Chatopdhyay, P.C. Rakshit, New Central Book Agency Pvt. Ltd (1990).
8. Advanced Practical Physics by M S Chauhan and S P Singh, Pragati Prakashan, Meerut (1984).

### Web Resources

1. <https://phys.libretexts.org>
2. <https://archive.nptel.ac.in/courses/115/107/115107131/>
3. <https://www.youtube.com/watch?v=vxh0yiw4Z8I>
4. <https://www.youtube.com/watch?v=z-Z1FYbgjLo>
5. [https://eng.libretexts.org/Bookshelves/Materials\\_Science/Supplemental\\_Modules\\_\(Materials\\_Science\)/Electronic\\_Properties/Compton\\_Effect](https://eng.libretexts.org/Bookshelves/Materials_Science/Supplemental_Modules_(Materials_Science)/Electronic_Properties/Compton_Effect)

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# बिरसा मुंडा ट्रायबल युनिवर्सिटी

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### School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS01MDCHE3: Climate change and Sustainable Development

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5%	12.5%	37.5%	12.5%

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01MDCHE3
Course Title	Climate change and Sustainable Development
Course Content Type (Th./Pr.)	Theory
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	60 Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. Students should be aware of pollution and different types of environmental pollution.
2. Impart knowledge of different type of disaster and its measures.
3. Students should be aware of water harvesting techniques
4. Students should learn changes of climate, its impact on human and other living being.

### Learning Outcomes

On the Completion of this course, students will able to:

1. Students come to know various types of pollution and its effects. Students learn to check pollution and contribute to the society.
2. Identify new ways of curbing pollution. They also prepare themselves to curb with disastrous incidents like earthquakes, floods etc.
3. Demonstrate an awareness of the difficulties involved in the detection of any unusual global warming 'signal' above the 'background noise' of natural variability in the Earth's climate and of attributing (in whole or in part) any such signal to human activity.
4. Students also know the technology and health. They can contribute to ease the problems related population and health of the community.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<ul style="list-style-type: none"><li>Pollution: Causes and Effects of Air Pollution, Water Pollution, Soil Pollution, Marine Pollution and Noise Pollution, Role of an individual in prevention of pollution,</li><li>Disaster management: Floods, Earthquakes, Cyclones and Landslides.</li></ul>	15
II	<ul style="list-style-type: none"><li>Social Issues: From unsustainable to sustainable development, Urban problems related to energy, Water conservation, Rainwater harvesting and Watershed management,</li><li>Resettlement and rehabilitation of people: It's Problems and concerns.</li></ul>	15
III	<ul style="list-style-type: none"><li>Climate Change and Global Warming: Climate change, Global warming, Acid rain, Ozone layer depletion, Issues involved in enforcement of environmental legislation.</li><li>Environment and Human Health, Role of information technology in environment and human health,</li></ul>	15
Reference Books		
<ol style="list-style-type: none"><li>Environmental Studies- Dr. Suresh K. Dhameja. Published by SK Kataria &amp; Sons, New Delhi-110006</li><li>Introduction to Environmental Studies- Chandar K. Sharma, Vrinda Publications Pvt. Ltd. Delhi-110091</li><li>Textbook of Environmental Studies for Undergraduate Courses- Erach Bharucha</li></ol>		
Web Resources		
<a href="https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf">https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf</a>		
Unit – IV Practical(s) (if any)		30 Hours
ASSIGNMENT/FIELD EXERCISES BASED ON TOPICS COVERED IN THEORY PAPERS		

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## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Subject Name:** BS01AECHE1 English Language Skills-I

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	50%	00	50%	00

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01AECHE1
Course Title	English Language Skills-I
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. To develop a foundational understanding of English grammar and vocabulary.
2. To enhance reading comprehension skills.
3. To improve basic writing skills for effective communication.

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Construct grammatically correct sentences.
2. Demonstrate the ability to understand and analyze written texts.
3. Produce clear and coherent written paragraphs.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Basic Grammar and Vocabulary</b> <ul style="list-style-type: none"><li>• Introduction to Parts of Speech</li><li>• Tenses, Articles, and Prepositions</li><li>• Basic Vocabulary: Word Formation, Synonyms, and Antonyms</li></ul>	15
II	<b>Reading and Writing Skills</b> <ul style="list-style-type: none"><li>• Reading Comprehension Techniques</li><li>• Sentence Structure and Paragraph Writing</li><li>• Basic Listening and Speaking Skills</li></ul>	15
<b>Reference Books</b>		
<ul style="list-style-type: none"><li>• Murphy, Raymond. English Grammar in Use. Cambridge University Press.</li><li>• Redman, Stuart. English Vocabulary in Use. Cambridge University Press.</li><li>• Nuttall, Christine. Teaching Reading Skills in a Foreign Language. Macmillan Education.</li></ul>		

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(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Subject Name:** BS01AECHE2 Fundamentals of Communication Skills

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	50%	00	50%	00

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01AECHE2
Course Title	Fundamentals of Communication Skills
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

- To introduce the fundamentals of communication.
- To develop effective speaking and listening skills.
- To enhance presentation and group discussion abilities.

#### Learning Outcomes

On the Completion of this course, students will able to:

- Understand the process and types of communication.
- Demonstrate effective verbal and non-verbal communication.
- Participate actively in group discussions and presentations.







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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Unit 1: Fundamentals of Communication</b> <ul style="list-style-type: none"><li>Communication Process, Types, and Barriers</li><li>Importance of Effective Communication</li><li>Non-verbal Communication: Body Language, Facial Expressions, Proxemics, Chronemics, Vocalics</li></ul>	15
II	<b>Unit 2: Effective Speaking and Listening</b> <ul style="list-style-type: none"><li>Techniques for Effective Speaking: Clarity, Tone, and Body Language</li><li>Active Listening Skills</li><li>Introduction to Presentation Skills</li></ul>	15
<b>Reference Books</b>		
<ul style="list-style-type: none"><li>Adler, Ronald B., and Jeanne Marquardt Elmhorst. Communicating at Work: Principles and Practices for Business and the Professions. McGraw-Hill Education.</li><li>Lucas, Stephen. The Art of Public Speaking. McGraw-Hill Education.</li><li>Duck, Steve, and David T. McMahan. Communication in Everyday Life: The Basic Course Edition with Public Speaking. SAGE Publications.</li></ul>		

**L::** Lecture, **T::** Tutorial, **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







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Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS01SECHE1: Fundamentals of Computer and Office Automation

Packages-I

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
1	0	1	2	0.25	-	0.5	0.25

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01SECHE1
Course Title	Fundamentals of Computer and Office Automation Packages-I
Course Content Type (Th./Pr.)	Theory/Practical
Course Credit	2
Sessions+ Lab. Per Week	1+2*
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. This course would make students acquainted with basics of computers.
2. Students can develop skills for effective use of Office Automation Tool.

### Prerequisites (if any)

Basic Understanding and Operating of Computer System

### Learning Outcomes

On the completion of this course, students will able to:

1. Explain the basic structure of computer and number system.
2. Summarize the Software and Operating System.
3. Apply and analyze various features into the documentation and presentation











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## School of Science B.Sc. (Chemistry) Programme

### Practical(s) (if any)

#### List of Sample Practical

1. Create/Delete a directory and files using DOS commands.
2. Create/Delete a files and folder in Windows.
3. Prepare a Bio-data in MS-Word.
4. Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters using Mail Merge.
5. Create and Design Admission/Enquiry Forms etc.
6. Design E-book cover pages / Magazine front/ books front/back page using cover page option in Insert Menu.
7. Create Business Cards using Shapes, text, and colours.
8. Make books content page or index page
9. Use smart art and create organization charts
10. Create a slide show presentation about BMTU.
11. Create slides with your own contents and decorate the text using Text Fill, Text Effect, Shape Outline, Shape Fill, and Shape Effect.
12. Create slides of your choice and give custom animation effects

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**PWE::** Practical Work Examination

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**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsamunda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS01SECHE2: Green House Technology

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	50%	00	50%	00

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01SECHE2
Course Title	Green House Technology
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. To enable students for pursuing respectable career through self-employment.
2. To develop abilities in farming business.
3. To develop the skilled to manage protective cultivation technology and construction of polyhouse.
4. To trained future industry professionals.
5. To impart comprehensive knowledge with extra emphasis on practice.

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Understand the concept and importance of greenhouse.
2. Learn operation and maintenance of greenhouse technology.
3. Gain the knowledge about different types of greenhouses.
4. Impart skill-based knowledge, which will helpful for start-up.







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Mūṇḁ Ḍrāyabala Yuniṁsiṁṁī

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<ul style="list-style-type: none"><li>• Introduction to greenhouse: Definition, concept, importance and scope.</li><li>• Greenhouse technology: operation, maintenance and management: light, temperature, humidity, pest and disease control, Advantages applications in agriculture.</li><li>• Types of Green House based on shape, utility, construction and covering material</li></ul>	15
II	<p>Structure and Construction of a Green House:</p> <ul style="list-style-type: none"><li>• Location,</li><li>• Frame work for various types of green house,</li><li>• Covering material,</li><li>• Construction of typical glass house/poly house/ net house,</li><li>• Construction of pipe framed greenhouse,</li><li>• Construction of floors and Layout,</li><li>• Design and development of low cost greenhouse structures.</li><li>• Automated greenhouses, microcontrollers, waste water recycling.</li><li>• Green House World Scenario</li><li>• Status in India</li></ul>	15
Reference Books		
<ol style="list-style-type: none"><li>1. Bose, T.K. and Som, T. K. 1986. Vegetable Crops in India. Naya Prakash, Kolkata.</li><li>2. Bose, T.K. and Yadav, L.P. 1992. Commercial Flowers. Naya Prakash, Kolkata.</li><li>3. Randhawa, G.S. and Mukhopadhyaya, A. 1994. Floriculture in India. Allied Publishers Pvt.Ltd. New Delhi.</li><li>4. Shanmugavelu, K.G. 1985. Production Technology of Vegetable Crops. Oxford and IBM Publishing Co. Pvt. Ltd., New Delhi.</li><li>5. Prasad S and Kumar U 2003. Commercial Floriculture. Agrobios.</li><li>6. Prasad S and Kumar U 2003. Greenhouse management of horticultural crops. 2nd Edition. Agrobios.</li><li>7. Principles of drip irrigation system, Dr. M.S. Mane, B.L.Ayare, Dr.S.S.Magar., Jain Bros., New Delhi</li><li>8. Principles of sprinkler irrigation, Dr. M.S. Mane, Dr.B.L.Ayare. Jain Bros., New Delhi</li></ol>		







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## School of Science B.Sc. (Chemistry) Programme

**L::** Lecture, **T::** Tutorial, **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

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**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsamunda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

Subject Code& Name: - BS01SECHE3: Yoga in Practice

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	N/A	N/A	2	25	N/A	25	N/A

Programme Name	B.Sc. (Chemistry)
Semester	1
Course Code	BS01SECHE3
Course Title	Yoga in Practice
Course Content Type (Th./Pr.)	Th.
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

- Explain the concept of yoga in the contemporary context as well as for personal growth and development.
- Reflect on one's capabilities and ways to enhance them so as to utilize the same in a better way
- Develop physically, mentally, socially, emotionally and spiritually.

#### Prerequisites (if any)

N/A

#### Learning Outcomes

On the Completion of this course, students will able to:

- Understanding ways to harmonies the body and mind through Yoga.
- Disciplining the mind through practicing Yoga.
- Particularity about the Yoga Darshan through the selected topics of Yoga Philosophy based on Patanjala Yogasutra.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>❖ Yoga: Asana, Pranayama and dhyana</b> <ul style="list-style-type: none"><li>➤ Yoga-Meaning and History</li><li>➤ Understanding Asana and Pranayama</li><li>➤ Asana: the basics</li><li>➤ Significance of Asana</li><li>➤ Surya Namaskara</li><li>➤ Nadi shodhan Pranayama</li><li>➤ Effect of Pranayama</li><li>➤ Importance of Dhyana</li></ul>	15
II	<b>❖ Pantanjali' Yogasutra and Chakra</b> <ul style="list-style-type: none"><li>➤ Introduction of Patanjali</li><li>➤ The Eight-Fold Yoga (Astanga Yoga)<ul style="list-style-type: none"><li>i) Yama ii) Niyama iii) Asana iv) Pranayama v) Pratyahara vi) Dharana vii) Dhyana viii) Samadhi</li></ul></li><li>➤ Pantanjali' Yogasutra: a summary</li><li>➤ Chakras:- Muladhara, Swadhisthana, Manipura, Anahata, Vishuddha, Ajna, Sahasrara</li></ul>	15
Reference Books		
<ol style="list-style-type: none"><li>1. Dasgupta, S. The Study of Patanjali. Calcutta: University of Calcutta Press, 1920.</li><li>2. Patanjali's Yog Pradeep- Swami Omanand Saraswati, Gita Press, Gorakhpur, 2013</li><li>3. Udayveer Shastri Granthavali 4, Patanjali- Yoga Darshanam, Udayveer Shastri, Govindram Hasanand, Delhi 6</li><li>4. Yog, Dr Puja Kotak, Bharti Print &amp; Publishing House, Ahmedabad, 2014</li><li>5. Shree Patanjalyogdarshan with Rahsyadipika- Pujyamaharaj Nathu Publisher Shree harjivan Shah 1999.</li></ol>		

**L::** Lecture, **T::** Tutorial, **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

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**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# બિરસા મુંડા ટ્રાયબલ યુનિવર્સિટી Birsa Munda Tribal University

રાજપિપલા, જિ. નર્મદા Rajpipla, Dist. Narmada  
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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS01IKCHE1: શ્રીમદ્ ભગવદ્ગીતા અને રામાયણનું જીવન સંગીત

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	N/A	N/A	2	25	N/A	25	N/A

Programme Name	B.Sc. (Chemistry)
Semester	1
Course Code	BS01IKCHE1
Course Title	શ્રીમદ્ ભગવદ્ગીતા અને રામાયણનું જીવન સંગીત
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	N/A
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. વિદ્યાર્થીઓ ભારતીય જ્ઞાનના ભંડારરૂપ આર્ષ ગ્રંથોનો પરિચય મેળવે.
2. શ્રીમદ્ ભગવદ્ગીતા એ ભારતીય તત્ત્વજ્ઞાનની આધારશીલા છે તેના પ્રાથમિક જ્ઞાનથી પરિચિત થાય તેમજ વિશ્વબંધુત્વની ભાવના કેળવાય.
3. શ્રીમદ્ ભગવદ્ગીતાના સારરૂપ તત્ત્વનો બોધ પામે.
4. રામાયણમાં નિરૂપિત જીવનમૂલ્યોથી માહિતગાર થાય.
5. રામાયણકાલીન સંસ્કૃતિ તેમજ આદર્શ જીવનશૈલીથી પરિચિત થાય.





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રાજપિપલા, જિ. નર્મદા Rajpipla, Dist. Narmada

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## School of Science B.Sc. (Chemistry) Programme

### Learning Outcomes

On the Completion of this course, students will able to:

1. શ્રીમદ્ ભગવદ્ગીતા અને રામાયણમાં પ્રબોધિત માનવમૂલ્યોથી અવગત થશે.
2. સ્વસ્થ જીવન માટે સમસ્યાઓનું સમાધાન તેમજ સ્વનિયમનનું કૌશલ્ય પ્રાપ્ત કરશે.
3. આદર્શ રામરાજ્યની સંકલ્પના દ્વારા લોકશાહી તેમજ પ્રજાવત્સલ રાજાથી પરિચિત થશે.
4. રામાયણના કથાનકનો પરિચય મેળવશે.
5. રામાયણમાં નિરુપિત પાત્રોના આદર્શ જીવનથી પરિચિત થશે.

### Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<ul style="list-style-type: none"><li>➤ શ્રીમદ્ ભગવદ્ગીતા વૈદિક ધર્મનો મૂલાધાર</li><li>➤ શ્રીમદ્ ભગવદ્ગીતાનો સારાંશ</li><li>➤ ગીતામાં જીવન જીવવાની કળા અથવા માનવજીવનમાં ઉપયોગીતા</li><li>➤ શ્રીમદ્ ભગવદ્ગીતામાં સાંપ્રત વૈશ્વિક સમસ્યાનો ઉકેલ</li><li>➤ શ્રીમદ્ ભગવદ્ગીતામાં ઇન્દ્રિયોને કાબુમાં રાખવાના ઉપાયો</li><li>➤ શ્રીમદ્ ભગવદ્ગીતામાં શિક્ષણ અને કેળવણી</li><li>➤ શ્રીમદ્ ભગવદ્ગીતામાં આંતર અને બાહ્ય સૌંદર્ય ખીલવવાનું શિક્ષણ</li></ul>	15





# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsamunda Tribal University

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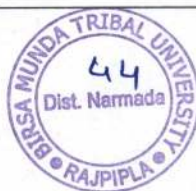
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## School of Science B.Sc. (Chemistry) Programme

II	<ul style="list-style-type: none"><li>➤ रामायणनो संक्षिप्त कथासार</li><li>➤ रामायणकालीन संस्कृति:-<ul style="list-style-type: none"><li>▪ समाजव्यवस्था, शासनव्यवस्था, अर्थव्यवस्था, शिक्षणव्यवस्था, लोकजुवन, वस्त्रो अने आभूषणो, भानपान, उत्सवो अने मोजशोभ, संरक्षण विचार, पुत्रुषार्थ विचार अने नैतिक मूल्य</li></ul></li><li>➤ रामायणमां पारिवारिक जुवन अने तेमांथी प्रतिबोधित जुवनमूल्यो.</li><li>➤ रामायणना पात्रो:<ul style="list-style-type: none"><li>▪ राम, लक्ष्मण, भरत, दशरथ, सीता, उर्मिला, हनुमान, रावण, जटायु, शबरी, त्रिजटा, विभीषण, श्रवण, अंगद</li></ul></li></ul>	15
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### Reference Books

1. श्रीमद् भगवद्गीतां जुवन संगीत- संपादन डॉ.दिनेश पी.माछी, प्रा.जुतेन्द्र आर्.टेलर, प्रा. राजेश.आर.कगराणा. प्रकाशन- संस्कृत विभाग, श्री मोहनसिंह छोटुभाई राठवा आदर्श कोलेज- पावी.
2. श्रीमद् भगवद्गीता(संपूर्ण)- डॉ.शांतिकुमार पंड्या, पार्श्व पब्लिकेशन, अमदावाड.
3. श्रीमद् भगवद्गीता એક નૂતન અભિગમ- डॉ.कुसुमबा जाडेजा, पार्श्व पब्लिकेशन, अमदावाड.
4. गीता अने आपणा प्रश्नो- स्वामी सचिदेदानंद- गूर्जर प्रकाशन, अमदावाड, १९८८
5. नैतिक शिक्षण अने श्रीमद् भगवद्गीता- डॉ.मुगतलाल थानकी, नवयुग प्रिन्टींग प्रेस, अमदावाड.
6. श्रीमद् भगवद्गीता- साधक संजुवनी सहित गुजराती टीका, स्वामी रामसुभदास, गीता प्रेस, गोरखपुर.
7. वाल्मीकि रामायण भाग - १ गुजराती अनुवाद, सस्तु साहित्य वर्धक कार्यालय, अमदावाड.
8. रामायण, समीक्षित वाचनानो गुजराती अनुवाद, डॉ. विजय पंड्या, पार्श्व पब्लिकेशन, अमदावाड.
9. रामायण, समीक्षित संपादन, ओरिएण्टल इन्स्टीट्यूट, बडोदरा.
10. आदिकवि वाल्मीकि, डॉ. राधावल्लभ त्रिपाठी, संस्कृत परिषद, सागर.







# બિરસા મુંડા ટ્રાયબલ યુનિવર્સિટી Birsā Munda Tribal University

રાજપિપલા, જિ. નર્મદા Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

### Web Resources

1. રામાયણની ચરિત્રકથાઓ )sadhanaweekly.com)
2. <https://www.gitasupersite.iitk.ac.in/srimad>
3. <https://www.valmiki.iitk.ac.in/>

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**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Subject Name:** BS01IKCHE2 Constitutional Values and Fundamental Rights

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	50%	00	50%	00

Programme Name	B.Sc. (Chemistry)
Semester	I
Course Code	BS01IKCHE2
Course Title	Constitutional Values and Fundamental Rights
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	N/A
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. To enhance the students' understanding and significance of the Indian Constitution.
2. To evaluation of the preamble of the Constitution.
3. To cultivate knowledge regarding the basic values of the Indian Constitution.
4. To raise students' understanding of their fundamental rights.
5. To uphold democratic ideals based on the equality of all societal members and individual liberty.

#### Learning Outcomes

On the Completion of this course, students will able to:

1. The study of the process of constitution making in India as well as the growth of the constitution.
2. An analysis of the fundamental aspects of the Constitution of India.
3. An analysis of the principles that are outlined in the constitutional values of the Indian Constitution.
4. A goal is to instil a sense of safety and confidence in the country's minority groups.







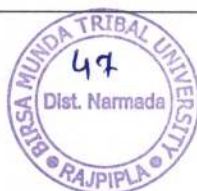
# बिरसा मुंडा द्रायबल युनिवर्सिटी Birma Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Constitution of India</b> A. Introduction of Constitution of India B. Nature of Constitution of India C. Salient Features of the Constitution of India D. Preamble E. Rule of Law F. Separation of Powers <b>Constitutional Values</b> A. JUSTICE - social, economic and political B. LIBERTY - thought, expression, belief, faith and worship C. EQUALITY - status and of opportunity D. FRATERNITY – dignity, unity and integrity of the Nation	15
II	<b>Fundamental Rights of the Indian Constitution</b> A. Introduction B. Article 12 - State C. Article 13 – Judicial Review D. Article 14 to 18 – Right to Equality E. Article 19 – Right to Freedom F. Article 20 – Freedom in respect of conviction offences G. Article 21 – Right to life and Personal liberty H. Article 22 – Freedom and safeguard against arbitrary arrest and detention I. Article 23 – 24 – Right Against Exploitation J. Article 25 to 28 – Freedom of Religion K. Article 29 – 30 – Cultural and Educational Rights of Minorities L. Article 32 to 35 – Constitutional Remedies	15







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Mūṇḍā Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

### Reference Books

1. Jain, M. P. (2022). Constituonal Law. LexisNexis.
2. Joshi, D. K. (2019). Constituion of India. Allahabad: Central Law Publication.
3. Myneni, S. R. (2011). Constitutional Law - I . Hyderabad: Asia Law House.
4. Pandey, D. J. (2019). Constitutional Law of India. Allahabad: Central Law Publication.
5. Rao, M. (2013). Constitutional Law. Lucknow: Eastern Book Company.

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**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsamunda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada  
Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS02MJCHE1 : General Chemistry-III

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MJCHE1
Course Title	General Chemistry-III
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. Explain why the s-block elements are grouped together. Label the alkali metals, alkaline earth metals, and noble gases within the s-block. Describe the reactions and properties of alkali metals and alkaline earth metals. Compare and contrast hydrogen and helium with the other s-block elements.
2. Define and identify alkanes, alkenes, alkynes, and cyclic hydrocarbons and list some properties of hydrocarbons.
3. Understand how the adsorption mechanism takes place on the surface of solids and what the factors effects on adsorption.

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Understand electronic configuration of elements, physical and chemical properties of elements and diagonal relationship of elements.
2. Prepare different inorganic compounds and how to use it.
3. Get idea about the formation of alkene compounds and different elimination reactions.
4. Understand different reaction isotherms and their applications and limitations.
5. Understand catalyst and their uses in different organic reactions.







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Chemistry of s-block elements</b> <ul style="list-style-type: none"><li>➤ General introduction.</li><li>➤ Electronic configuration, atomic and ionic radii, ionization potential.</li><li>➤ Physical and Chemical properties [Reactivity towards air, water, halogen and hydrogen],</li><li>➤ Special characteristics such as metallic character, polarizing power, hydration energy, Flame coloration,</li><li>➤ Inert pair effect, relative stability of different oxidation state,</li><li>➤ Complex formation tendency of s-block elements,</li><li>➤ Diagonal relationship of (1) lithium with magnesium (2) beryllium with aluminum, anomalous behavior of Li, Be, uses.</li><li>➤ Preparation, Physical properties and uses of <math>\text{Na}_2\text{CO}_3</math>, <math>\text{NaHCO}_3</math>, <math>\text{NaCl}</math>, <math>\text{NaOH}</math>, <math>\text{CaO}</math>, <math>\text{CaCO}_3</math>, <math>\text{Ca(OH)}_2</math> and Plaster of paris.</li><li>➤ Application of s-block element</li></ul>	15
II	<b>Chemistry of alkenes and its applications</b> <ul style="list-style-type: none"><li>➤ Hydrocarbons containing Carbon-Carbon <math>\pi</math> bonds</li><li>➤ Formation of alkene by Elimination reactions, dehydration of alcohol, dehydrohalogenation of alkyl halide, dehalogenation of vicinal and germinal dihalides</li><li>➤ Saytzeff's rule and Hofmann eliminations</li><li>➤ Electrophilic addition reaction and its mechanism (Markownikov/ Anti Markownikov rule).</li><li>➤ Reactions of alkenes: Oxymercuration-demercuration, Hydroboration oxidation, Ozonolysis, Reduction (catalytic)</li></ul>	15







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada  
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## School of Science B.Sc. (Chemistry) Programme

III	<b>Adsorption and Catalysis</b> <ul style="list-style-type: none"><li>➤ Introduction</li><li>➤ Characteristics and factors affecting on adsorption</li><li>➤ Mechanism of Adsorption</li><li>➤ Types of Adsorptions (physical and chemical)</li><li>➤ Adsorption isotherm and Freundlich equation with limitations,</li><li>➤ Langmuir theory of adsorption: assumptions, derivation, modification in equation at very low and high pressure.</li><li>➤ BET Theory</li><li>➤ Applications of adsorption.</li><li>➤ Introduction of catalysis</li><li>➤ Types of catalysis (homogeneous and heterogeneous)</li><li>➤ Active centers, Enzyme catalysis and its characteristics.</li></ul>	15
<b>Unit – IV Practical(s) (if any)</b> <span style="float: right;"><b>30 Hours</b></span>		
<b>Volumetric Titration (any four)</b> <ol style="list-style-type: none"><li>1. To determine the strength of NaOH and Na<sub>2</sub>CO<sub>3</sub> present in the solution mixture of NaOH and Na<sub>2</sub>CO<sub>3</sub> and to find out their percentage composition.</li><li>2. To determine the strength of NaHCO<sub>3</sub> and Na<sub>2</sub>CO<sub>3</sub> present in the solution mixture of NaHCO<sub>3</sub> and Na<sub>2</sub>CO<sub>3</sub> and to find out their percentage composition.</li><li>3. To determine the Normality, g/liter and Molarity of H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. 2H<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> present in the solution mixture of H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. 2H<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> by using XN NaOH and YN KMnO<sub>4</sub> Solution.</li><li>4. To determine the Normality, g/liter and Molarity of H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. 2H<sub>2</sub>O and K<sub>2</sub>C<sub>2</sub>O<sub>4</sub> present in the solution mixture H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. 2H<sub>2</sub>O and K<sub>2</sub>C<sub>2</sub>O<sub>4</sub> by using XN NaOH and YN KMnO<sub>4</sub> Solution.</li><li>5. To determine the amount of Ca<sup>+2</sup> and Mg<sup>+2</sup> ion by EDTA solution from the mixture solution of CaCl<sub>2</sub> and MgCl<sub>2</sub>.</li></ol>		







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

### Reference Books

1. Basic Inorganic Chemistry – Gurdeep & Chatwal.
2. Inorganic Chemistry - J. N. Gurtu & H. C. Khera
3. Principles of Inorganic chemistry- B. R. Puri, L. R. Sharma and K. C. Kalia; Vallabh publications, Delhi.
4. Coordination chemistry-Ajai Kumar ; Aaryush Education, U.P.
5. Organic Reaction Mechanism, including Reaction Intermediates, V. K. Ahluwalia
6. Organic Chemistry, Vol-1, Jagdamba Singh, L. D.S. Yadav, Pragati Prakashan, 8th edition-2013
7. Organic Chemistry by Morrison and Boyd.
8. Essentials of Physical Chemistry, B. S. Bahl, G. D. Tuli and Arun Bahl, S. Chand & Co.
9. Physical Chemistry, 7th edition P. C. Rakshit
10. Elements of Physical Chemistry, B. R. Puri, L. R. Sharma and Madan Pathania, Vishal Publishing Co. Jalandhar.
11. Organic Chemistry- Nimai Tewari Volume I & II

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(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada  
Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS02MJCHE2 General Chemistry-IV

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MJCHE2
Course Title	General Chemistry-IV
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. Infer the general trends in the chemistry of P-block elements.
2. Explain the trends in physical and chemical properties of group 13 and 14 elements.
3. To get idea about the formation of alkynes and reactions of alkynes.
4. To identify the substances may or may not be aromatic.
5. Interpret the concept of aromaticity and the main properties of aromatic compounds · associate polarization of a bond with electronegativity.
6. Established the ionic equilibrium between acids, bases and salts

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Classify the properties of oxides of p-block elements and their chemical behavior.
2. How to synthesize different inorganic compounds like Borax, Boric acid, Boron halides etc. and their applications.
3. Understand about nucleophilic addition reaction and aromatic behavior of organic compound.
4. Understand about ionic equilibrium of acids, basics and salts.
5. Get information about hydrolysis constant, equilibrium constants and solubility product of water.
6. Explain the buffer solution and types of buffer solutions.







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Chemistry of p block elements (group 13 and 14)</b> <ul style="list-style-type: none"><li>➤ Introduction of Oxides</li><li>➤ Properties of oxides, Classification of oxides based on their chemical behavior and based on their oxygen content,</li><li>➤ Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses; Borax, Boric acid, Boron nitrides, Borohydrides (diborane), Boron halide and Aluminum halide acidity comparison</li><li>➤ Allotropes of carbon</li><li>➤ Some important compounds of carbon and silicon</li></ul>	15
II	<b>Chemistry of alkanes and its application &amp; aromaticity</b> <ul style="list-style-type: none"><li>➤ Formation of alkynes: Dehydrohalogenation of vicinal and geminal dihalides, Dehalogenation of tetrahalides</li><li>➤ Reactions of alkynes: Acidity, electrophilic addition reactions like halogenation, hydrohalogenation, hydration, hydroboration, addition of carbene and catalytic hydrogenation. Nucleophilic addition reaction with hydrogen cyanide and alcohols.</li><li>➤ Alkylation of terminal alkynes.</li><li>➤ Criteria for aromatic, non-aromatic and antiaromatic compounds, applications of Huckel's rule to simple annulene, cyclic carbocation/anion.</li></ul>	15







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

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## School of Science B.Sc. (Chemistry) Programme

III	<b>Ionic Equilibrium</b> <ul style="list-style-type: none"><li>➤ Classification of equilibrium</li><li>➤ factor affecting of equilibrium</li><li>➤ Common ion effect of acid and base</li><li>➤ Determination of equilibrium Constant</li><li>➤ Concept of acid base theory: Arrhenius, Bronsted-Lowry, Lewis</li><li>➤ Types of electrolytes,</li><li>➤ Dissociation constants of weak acids and bases, and its Numerical</li><li>➤ Hydrolysis of salts: Definition of hydrolysis of salts, Salts of strong acids and bases,</li><li>➤ Relation among <math>K_h</math>, <math>K_a</math>, or <math>K_b</math> and <math>K_w</math>,</li><li>➤ Buffer solutions: Definition and types of buffer solutions, Buffer action, Derivation of Henderson Hasselbalch equation,</li><li>➤ Numerical</li></ul>	15
<b>Unit – IV Practical(s)</b>		<b>30 Hours</b>
<p><b>Organic qualitative analysis (organic spotting)</b> Identification of Aromatic Hydrocarbons or Compounds containing a functional group (other than multiple bond) using Physical and Chemical tests. (Minimum 08 compounds covering all the chemical nature must be given) Examples: Carboxylic acids: Aliphatic acids like oxalic and succinic acid, <b>Aromatic acids:</b> Benzoic acid, cinnamic acid and phthalic acid <b>Phenols:</b> <math>\alpha</math>-naphthol, <math>\beta</math>-naphthol, Resorcinol <b>Bases:</b> Aniline, N,N dimethyl aniline, N,N diethyl aniline <b>Neutral:</b> Acetone, Ethyl methyl ketone, Ethyl acetate, naphthalene, anthracene, nitrobenzene, benzamide, urea, thiourea, chloroform, acetanilide, carbon tetra chloride, chloroform.</p>		







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## School of Science B.Sc. (Chemistry) Programme

Subject Code & Name: - BS02MICHE1 Basic Concepts of Zoology-II

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MICHE1
Course Title	Basic Concepts of Zoology-II
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

The student develop an understanding of taxonomy of chordates from Hemichordata to Mammalia, and understands the complex interactions of different living organisms.

### Prerequisites (if any)

Student must know about different strata and hierarchy of taxonomy.  
Student must aware about specific terms used for animal cell biology and genetics.

### Learning Outcomes

On the Completion of this course, students will able to:

1. Students will able to learn about the taxonomy and diversity of different classes of chordate animals.
2. Students will learn about structure and functions of animal cell and cell organelles.
3. Students will learn about basic concepts of Non- Mendelian inheritance.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>General characters of chordates with examples:</b>  1. Difference between Non-chordates and Chordates 2. General characters of Hemichordata, Protochordata, Cyclostomata, Pisces, Amphibia, Reptilia, Aves and Mammalia. 3. Suitable examples (as per Practical Syllabus)	15
II	<b>Basic Cell Biology: Cell organelles and Chromosomes</b>  <ul style="list-style-type: none"><li>• Ultra-structure of Plasma membrane (different models)</li><li>• Golgi body</li><li>• Lysosome</li><li>• Centriole/Basal bodies</li><li>• Cilia/Flagella</li><li>• Cytoskeleton.</li><li>• Structure and types of Chromosome based on position of centromere.</li></ul>	15
III	<b>Genetics: Non-mendelian inheritance</b>  1. Epistasis or Non-allelic Gene interactions. <ul style="list-style-type: none"><li>• Supplementary (recessive) Genes – Coat color in mice (9:3:4)</li><li>• Complementary (double recessive) Genes – Flower color in <i>Lathyrus odoratus</i> (Sweet pea plants) (9:7).</li></ul> 2. Sex linked Inheritance: <ul style="list-style-type: none"><li>• Color Blindness and Eye color in <i>Drosophila</i>.</li></ul> 3. Y-linked Holandric genes (Baldness in men)	15







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## School of Science B.Sc. (Chemistry) Programme

Unit – IV Practical(s) (if any)	30 Hours
1. Study of general characters of Hemichordata and examples using laboratory slides, charts and specimens; Balanoglossus.	
2. Study of general characters of Protochordata – Urochordata and Cephalochordata examples using laboratory slides, charts and specimens; Ascidian, Herdmania, Salpa and Amphioxus.	
3. Study of general characters Cyclostomata and examples using laboratory slides, charts and specimens; Lamprey (Petromyzon)	
4. Study of general characters of Pisces and examples using laboratory slides, charts and specimens; Sting ray fish, Electric ray fish, Rohu, Catla, Sea Horse (Hippocampus), Eel (Anguilla).	
5. Study of general characters of Amphibia and examples using laboratory slides, charts and specimens; Ichthyophis, Salamander, Hyla.	
6. Study of general characters of Reptilia and examples using laboratory slides, charts and specimens; Turtle, Common House Lizard, Horned Toad, Chamaeleon, Rat snake and Sea Snake.	
7. Study of general characters of Aves and examples using laboratory slides, charts and specimens; Stork, Pelican, Goose, Kite, Peacock, Pigeon, Cuckoo, Parakeet, Kingfisher, Crow, Crane and Red-wattled Lapwing.	
8. Study of general characters of Mammalia and examples using laboratory slides, charts and specimens; Hedge Hog, Flying fox, Blue Whale, Elephant, Dugong, Squirell, Indian Hare, Scaly anteater.	
9. Study of Cytology : (i) Plasma membrane (ii) Golgi body (iii) Lysosomes (iv) Centriole/Basal bodies (v) Cilia/Flagella (vi) Cytoskeleton	
10. Study of Genetics: (i) Structure of chromosome (ii) Recessive Epistasis (9:3:4) (iii) Double recessive Epistasis (9:7) (iv) X-linked- color blindness (v) Y-linked- Holandric genes	

**L::** Lecture, **T::** Tutorial , **P::**Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS02MICHE2 Fundamentals of Mechanics & Optics

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MICHE2
Course Title	Fundamentals of Mechanics & Optics
Course Content Type(Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

Students will be able to study

1. To understand the basic concepts of types of waves with special reference to Ultrasonic waves and its applications. The unit also introduces understanding of oscillations with special emphasis on properties of simple harmonic motion observed in case studies of different types of pendulums.
2. To understand the theoretical concepts of material behaviour with particular emphasis on their elastic property.
3. To provide exposure to various properties of Laser, production techniques of Laser and its applications.

### Prerequisites (if any)

12<sup>th</sup> Science passed with Physics subject.







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## School of Science B.Sc. (Chemistry) Programme

### Learning Outcomes

On the Completion of this course, students will able to:

1. The Student will get the overview of core concepts in the field of mechanics and basic optics.
2. Able to understand elastic nature of material, types of elastic modulus and different methods to determine elastic modulus.
3. Learn the structure and properties of lasers, their performance and applications in engineering and medical fields.
4. Learn the basic necessary mathematics tools to solve mechanics problems.

### Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Elasticity</b> Introduction, Definitions of Load, Stress and Strain, Hooke's Law & Stress-strain diagram, Three types of elasticity:(i) Young's modulus (ii) Bulk Modulus and (iii) Modulus of Rigidity, Work done per unit volume in elongation strain, Deformation of a cube- (Bulk modulus, Modulus of rigidity, Young modulus), Relation connecting the elastic constants, Poisson's ratio, Relation for $K$ and $\eta$ in terms of Poisson's ratio, Limiting values of $\sigma$ , Determination of Poisson's ratio for rubber, Twisting couple on a cylinder (or wire), Torsional pendulum, Determination of $\eta$ -Static method (Horizontal twisting apparatus for a rod), Bending of beams, Bending moment, The cantilever-when the weight of beam is ineffective, Depression of a beam supported at the ends when the beam is loaded at the centre, Related Numerical	15
II	<b>Fiber optics and Ultrasonic waves</b> Introduction, Fiber- Optic System, The Primary advantages of Fiber-Optic Communication compared to metallic cable (Electrical) communication, Fiber cable construction, Basic Principle- Total internal reflection, Acceptance angle and Numerical Aperture, Propagation of light through optical fiber, index Profile, Fiber configurations, Difference between various configurations, Related Numerical	15
II	Introduction to Ultrasonic waves, Production of ultrasonic waves (1) Magnetostriction method (2) Piezo-electric method, Detection of Ultrasonic, Properties of Ultrasonic, Wavelength of Ultrasonic waves, Applications of ultrasonic waves, Related Numerical	15 .







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## School of Science B.Sc. (Chemistry) Programme

III	<b>LASER</b> Introduction, Properties of LASER, Stimulated absorption, Spontaneous emission and Stimulated emission, Relation between Einstein's A and B coefficients, Population Inversion, Pumping, Main component of LASER, ND: YAG LASER, CO <sub>2</sub> LASER, Application of LASER in material processing, Holography and Other application of Laser, Related Numerical	15
<b>Unit-IV-Practical(s)</b>		<b>(30)</b>
<ol style="list-style-type: none"><li>1. Wattage of the bulb.</li><li>2. Y by Cantilever</li><li>3. <math>\eta</math> by static method</li><li>4. Depression of a beam when loaded at middle.</li><li>5. Determine the Moment of Inertia of different bodies using bifiller suspension method.</li><li>6. To measure the angle of prism and calibration of spectrometer.</li><li>7. Determine resolving power of prism.</li><li>8. Measure elastic constants using Searl's method.</li></ol>		
<b>Text Book(s)</b>		
<ol style="list-style-type: none"><li>1. Unit 1: Mechanics by D. S. Mathur, S. Chand Publication</li><li>2. Unit 2: (i) Engineering Physics by R K Gaur and S L Gupta, Dhanpatrai Publication (ii) Engineering Physics by G. Vijayakumari, Vikas Publishing house,</li><li>3. Unit 3: LASER by K. Rajgopal, PHI Learning, New Delhi</li></ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"><li>1. Mechanics by Prof. D.S.Mathur, Revised by Dr. P.S. Hemne, Revised Edition, S.Chand Publication.</li><li>2. Basics of LASER Physics by Karl. F.Rank, 2<sup>nd</sup> Edition, Springer Publication.</li><li>3. A Textbook of Optics, D. N. Vasudeva, Atma Ram &amp; Sons, Delhi (20<sup>th</sup> Edition).</li><li>4. Practical Physics by Gupta, Kumar Pragati Prakashan</li><li>5. B.Sc. Practical Physics by C.L. Arora, S.Chand Publication</li></ol>		
<b>Web Resources</b>		
<ol style="list-style-type: none"><li>1. <a href="https://phys.libretexts.org">https://phys.libretexts.org</a></li><li>2. <a href="https://www.youtube.com/watch?v=ssv9vDWKQDk">https://www.youtube.com/watch?v=ssv9vDWKQDk</a></li><li>3. <a href="https://archive.nptel.ac.in/courses/115/102/115102124/">https://archive.nptel.ac.in/courses/115/102/115102124/</a></li><li>4. <a href="https://youtu.be/i1EI503LhFQ?si=wpJLHKrjVFT-GQDN">https://youtu.be/i1EI503LhFQ?si=wpJLHKrjVFT-GQDN</a></li><li>5. <a href="https://archive.nptel.ac.in/courses/104/104/104104085/">https://archive.nptel.ac.in/courses/104/104/104104085/</a></li><li>6. <a href="https://nptel.ac.in/courses/115106119">https://nptel.ac.in/courses/115106119</a></li></ol>		







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## School of Science B.Sc. (Chemistry) Programme

**L:** Lecture, **T:** Tutorial , **P:**Practical

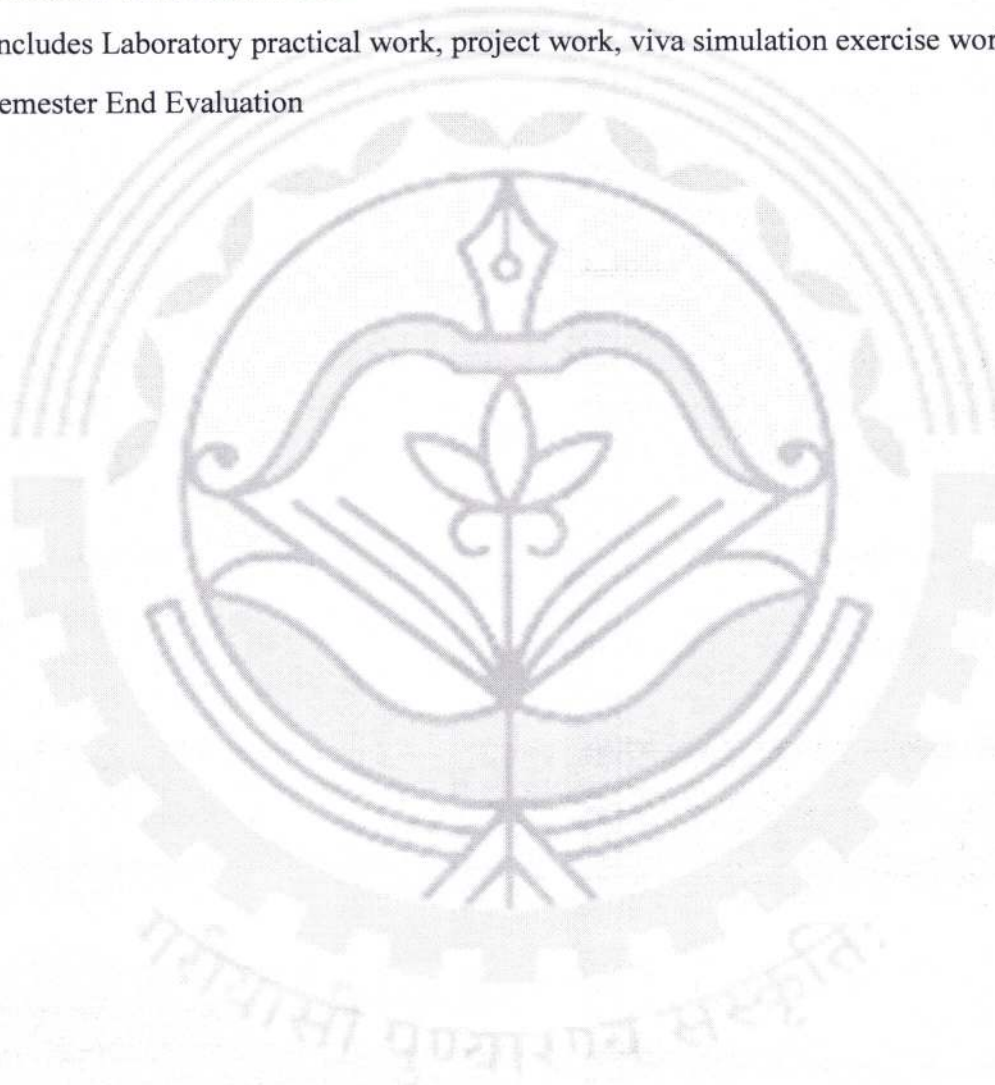
**CCE:** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

**PWE:** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE:** Semester End Evaluation







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## School of Science B.Sc. (Chemistry) Programme

Subject Code & Name: - BS02MICHE3 Mathematics-II

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MICHE3
Course Title	Mathematics-II
Course Content Type(Th./Pr.)	Theory & Practical
Course Credit	3 +1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

Students will able to study

1. Understanding the concept of differentiation and its applications.
2. Developing the ability to find derivatives of various functions using differentiation rules.
3. Exploring differential equations and their real world applications.

### Prerequisites (if any)

12<sup>th</sup> Science passed with Mathematics as a subject./

### Learning Outcomes

On the Completion of this course, students will able to:

1. Apply the knowledge of differential equation and its application.
2. Recall and understand limit and continuity of functions of several variables.
3. Recall Young's and Schwartz's theorem without proof.
4. Understand partial differentiation.
5. Solve problems related to partial differentiation.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Revision of Ordinary differential equation , Order and degree of differential equation, Variable separable equation, Homogeneous differential equation and Non- homogeneous differential equations. Differential Equations of First Order and First Degree: 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. Differential equations of first order and higher degree: Differential equations of first order and first degree solvable for x, solvable for y, solvable for p.	15
II	Clairaut's form of differential equation and Lagrange's form of differential equations. Linear differential equations of higher order Linear differential equations of higher order with constant coefficients. Operator D, Meaning of auxiliary equation, Roots of auxiliary equation and solution of auxiliary equation $f(D)y = 0$ for real roots and complex roots, Operator $1/D$ . Solution of differential equations of the type $f(D)y = X$ . Meaning of complimentary function (C.F.) and Particular integral (P.I.). Methods to obtain Particular integral(P.I.) when $X = e^{ax}$ , $X = \sin mx$ , $X = \cos mx$ , $X = \sin (ax+b)$ , $X = \cos(ax+b)$ , $X = x^m$ , $X = e^{ax} V$ , V is the function of x.	15





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## School of Science B.Sc. (Chemistry) Programme

III	Limit and continuity of function of several variables. Partial derivatives, Partial derivatives of higher order, Partial differentiation of composite function, Homogeneous function, Euler's theorem on homogeneous function of two and three variables, Total differential and chain rule, Change of variables, Partial differentiation of implicit function, Total differential Young's and Schwartz's theorem (without proof). Errors and approximate values, Jacobians, Taylor's theorem of function of two variables, Maxima, Minima, Saddle points of function of several variables, Lagrange's method of undetermined multipliers.	15
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### Unit – IV Practical(s)

30 Hours

1. Practical problem based on homogeneous differential equation.
2. Practical problem based on non-homogeneous differential equation.
3. Practical problem based on linear differential equations of first order and first degree.
4. Practical problem based on method of solving of Bernoulli's differential equation.
5. Practical problem based on method of solving Exact differential equation.
6. Practical problem based on method of solving Lagrange's differential equations.
7. Practical problem based on method of solving differential equations of the type  $f(D)y = e^{ax}$ .
8. Practical problem based on method of solving differential equations of the type  $f(D)y = \sin(ax+b)$ .
9. Practical problem based on method of solving differential equations of the type  $f(D)y = \cos(ax+b)$ .
10. Practical problem based on method of solving differential equations of the type  $f(D)y = x^n$ .
11. Practical problem based on method of solving differential equations of the type  $f(D)y = e^{ax} x^n$ .
12. Practical problem based on method of solving differential equations of the type  $f(D)y = \sin(ax + b)$ .
13. Practical problem based on method of solving differential equations of the type  $f(D)y = \cos(ax + b)$ .
14. Practical problem based on method of solving Linear differential equations with variable coefficients.

### Reference Books

1. Differential Calculus by Shanti Narayan
2. Differential Calculus by Gorakh Prasad
3. Differential Equations by D. A. Murray
4. A Text book of Calculus, S. C. Arora and Ramesh Kumar, Pitamber Publishing, New Delhi







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## School of Science B.Sc. (Chemistry) Programme

### Web Resources

1. <https://math.libretexts.org/>
2. <https://archive.nptel.ac.in/courses/111/104/111104144/>
3. <https://archive.nptel.ac.in/courses/111/106/111106146/>

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## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS02MDCHE1: Agricultural Chemistry

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MDCHE1
Course Title	Agricultural Chemistry
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

1. Agricultural chemistry often aims at preserving or increasing the fertility of soil with the goals of maintaining or improving the agricultural yield and improving the quality of the crop
2. As a form of applied sciences, some main aims of agricultural chemistry are: Increase yield of crops and livestock. Improving the quality of products. Reducing the cost of products.
3. To convert natural resources into viable business enterprises through scientific, technical, public private partnership and marketing support.







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## School of Science B.Sc. (Chemistry) Programme

### Learning Outcomes

On the Completion of this course, students will able to:

1. Demonstrate the ability to apply appropriate theoretical knowledge, access relevant information, understand the principles of project and experimental design
2. Utilize practical skills, technology and computational systems when addressing problems and challenges related to agriculture.
3. Students will understand and analyze the current events and issues that are occurring in agriculture and how they affect your future in agriculture.
4. Students will be able to recognize and examine the relationships between inputs and outputs in their agricultural field to make effective and profitable decisions.
5. Acquire the ability to engage in independent and life-long learning in the ever-changing agricultural production system/enterprises.

### Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Introduction of Soil Science</b> Soil-pedagogical and edaphological concepts, origin of the earth, rocks and minerals, weathering, soil profile, retention of water by soil, movement of soil water, layer silicate clays-genesis and classification, cation and anion exchange, humus-fraction of organic matter, carbon cycle, soil colloids, soil organic matter	15
II	<b>Soil Chemistry, Soil Fertility &amp; Nutrient Managements</b> Soil chemistry, soil pH and buffer pH, soil as a source of plant nutrient, all about nitrogen, phosphorous, potassium, secondary nutrients, micro nutrients, nutrient deficiency and toxicity, soil fertility evolution	15
III	<b>Manures, Fertilizers &amp; Agrochemicals</b> Manures-types, composition and values, green manures, composition of organic waste, classification of fertilizers-N,P and K, Nitrogenous fertilizers, potassium fertilizers, secondary and micronutrients fertilizers, complex fertilizers, mixed fertilizers, organophosphates, impacts of fertilizers on the environment Insecticides, herbicides, pesticides	15







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## School of Science B.Sc. (Chemistry) Programme

Unit – IV Practical(s)	30 Hours
<b>Basic techniques &amp; Calculations (Any five)</b>	
<ol style="list-style-type: none"><li>1. Determination of EC and pH of soil</li><li>2. Determination of cation exchange capacity of soil</li><li>3. Estimation of organic carbon content in soil</li><li>4. Determination of densities of soil</li><li>5. Determination of moisture content from soil and plant</li><li>6. Determination of maximum water holding capacity (MWHC) of soil.</li><li>7. Determination of hydraulic conductivity of soil</li></ol>	
<b>Text Book(s)</b>	
<ol style="list-style-type: none"><li>1. Introductory soil science, D.K. Das, Kalyani publishers</li></ol>	
<b>Reference Books</b>	
<ol style="list-style-type: none"><li>1. A handbook of soil. Fertilizer and manure, P.K. Gupta, Agribios</li><li>2. Soil fertility and fertilizer, samual L. Tisdale and Nelson, PHI Learning publishers</li><li>3. Fundamentals of soil science, V.N. Sahai, Kalyani publishers</li></ol>	
<b>Web Resources</b>	
<a href="http://www.agrigyan.in">www.agrigyan.in</a>	

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**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

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School of Science  
B.Sc. (Chemistry) Programme  
Subject Code & Name: - BS02MDCHE2 Bio-Chemistry

## Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MDCHE2
Course Title	Bio-Chemistry
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3 + 2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

## Learning Objectives

The course aims to provide student with an understanding of biomolecules such as proteins and carbohydrates focusing on their structural underpinning, unique properties, biological roles and functions and interrelations.

## Prerequisites (if any)

## Learning Outcomes

On the Completion of this course, students will able to:

1. Acquainted with chemical a molecular foundations of life and appreciate the role of water in biological system.
2. Able to comprehend the structure, function and acid-base properties of amino acids.
3. Explain the hierarchical structure of structure proteins and their biological significance.
4. Explain the structures and properties of carbohydrates.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Foundation of Biochemistry</b> <ul style="list-style-type: none"><li>• Properties and structure of water molecule.</li><li>• pH, p<sup>H</sup> scale and Buffers (Phosphate and Citrate buffer).</li></ul> <b>Introduction and Classification of Carbohydrates:</b> <ul style="list-style-type: none"><li>• Sources and nutritive values of Carbohydrates.</li><li>• Monosaccharides: Aldoses and ketoses, trioses, tetroses, pentoses and hexoses.</li><li>• Stereoisomerism of Monosaccharides.</li><li>• Disaccharides: Maltose, Lactose and Sucrose.</li><li>• Polysaccharides: Starch and Glycogen.</li><li>• Structural polysaccharides: Cellulose and chitin.</li></ul>	15
II	<b>Introduction and Classification of Proteins:</b> <ul style="list-style-type: none"><li>• Sources and nutritive values of Proteins.</li><li>• Properties of proteins.</li><li>• Classification of proteins: Simple proteins, Compound proteins and Derived proteins.</li><li>• Biological functions of proteins.</li><li>• Configuration of Proteins with their examples: Primary, Secondary, Tertiary and Quaternary.</li><li>• Properties and structure of Amino acids.</li><li>• Classification of Amino acids.</li></ul>	15
III	<b>Introduction and Classification of Lipids:</b> <ul style="list-style-type: none"><li>• Sources and nutritive values of Lipids.</li><li>• Properties of Lipids.</li><li>• Classification of Lipids: Simple Lipids, Compound Lipids and Derived Lipids.</li><li>• Structure and classification of fatty acids.</li><li>• Biological functions of Lipids.</li></ul>	15







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

### Unit – IV Practical(s)

30 Hours

1. Preparation of buffers, phosphate and acetate buffers.
2. Determination of pKa of acetic acid.
3. Qualitative tests for carbohydrates.
4. Qualitative tests for amino acids.
5. Estimation of amino acid by Ninhydrin method.
6. Separation of amino acid mixture by thin layer chromatography/paper chromatography.
7. Estimation of vitamin C from lemon fruits.

### Text Book(s)

1. Elementary Biochemistry by Jain and Jain.
2. Biochemistry by U. Satyanarayana and U. Chakrapani.

### Reference Books

1. Lehninger: Principles of Biochemistry by D.L Nelson, Lehninger A.L. and Cox M.M.
2. Biochemistry by Berg J. M. Tymoczko J. L. and L. Stryer.
3. Biochemistry by Voet & Voet.

**L::** Lecture, **T::** Tutorial, **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS02MDCHE3 Basic Electronics

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	37.5 %	12.5 %	37.5 %	12.5 %

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02MDCHE3
Course Title	Basic Electronics
Course Content Type(Th./Pr.)	Theory + Practical
Course Credit	3+1
Sessions+ Lab. Per Week	3+2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. Learn about basic electronic components like semiconductor diode and transistor.
2. They will learn about types of special purpose diode, rectifier their types and its real world applications.
3. They will learn about characteristics of transistors, Boolean expression of different gates and various number systems.

### Learning Outcomes

On the Completion of this course, students will able to:

1. The Student will get the overview of core concepts in the field of electronics.
2. Able to apply the theoretical knowledge of these fields to analyze and solve the problems of day to day life.
3. Learn the basic necessary analog and digital electronics.







# बिरसा मुंडा द्रायबल युनिवर्सिटी Birsā Mūṇḍā Drāyaball Yūnīvārsīṭī

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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Semiconductor Diode:</b> <ul style="list-style-type: none"><li>➤ Semiconductor Diode, Semiconductor diode as a rectifier, Rectifiers, Half wave rectifier, Output frequency of Half wave rectifier, Efficiency of Half wave rectifier, Full wave rectifier, Center tap full wave rectifier, Full wave Bridge Rectifier, Output frequency of full wave rectifier, Efficiency of full wave rectifier, Faults in center tap full wave rectifier, Nature of Rectifier output, Ripple factor, Filter circuits, Types of Filter circuits,</li><li>➤ Zener Diode, Reverse breakdown of diodes, Equivalent circuit of Zener Diode, Zener Diode as a voltage stabilizer, Solving Zener diode circuits, Application of Diodes and related problems</li></ul>	15
II	<b>Transistor:</b> <ul style="list-style-type: none"><li>➤ Transistor Action, Transistor biasing, Transistor symbol, Transistor circuit as an amplifier, Transistor connections, Common base connection, Characteristics of common Base Connection, Common emitter connection, characteristics of common emitter connection, Measurement of leakage current, Characteristics of common Emitter connection, Common Collector connection, Transistor load line analysis, Operating point, Performance of transistor amplifier, Cut off and saturation points</li></ul>	15
III	<b>Digital Electronics:</b> <ul style="list-style-type: none"><li>➤ Number Systems, The Decimal Numbers system, Binary system, Binary to Decimal Conversion, binary fraction, Decimal to binary conversion, Octal system octal to decimal conversion, decimal to octal conversion, octal to binary conversion, binary to octal conversion, advantages of octal number system, Hexadecimal number system, Count beyond F in Hexadecimal system, Binary to Hexadecimal conversion, Hexadecimal to binary conversion,</li><li>➤ Positive and Negative Logic, The OR gate, Diode OR gate, Transistor OR gate, Three input OR gate, Exclusive OR gate, The AND gate, Diode OR gate, NOT gate, Equivalent circuit for a NOT gate, The NOT operation, Bubbled gates, The NOR gates, NAND gates, NOR and NAND gates as a universal gates, The XOR gates related problems.</li></ul>	15







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## School of Science B.Sc. (Chemistry) Programme

Unit-IV-Practical(s)	(30)
<ol style="list-style-type: none"><li>1. To study V-I characteristics of P-N Diode.</li><li>2. To study V-I characteristics of Zener Diode.</li><li>3. Zener Diode as a voltage regulator.</li><li>4. Half wave Rectifier.</li><li>5. Full wave Rectifier.</li><li>6. Full wave Bridge Rectifier.</li><li>7. Logic gates.</li><li>8. V-I characteristics of Common Emitter Transistor.</li></ol>	
Text Book(s)	
<ol style="list-style-type: none"><li>1. Unit 1 &amp; 2: Principles of Electronics by V. K. Mehta, Rohit Mehta, 12<sup>th</sup> edition, S. Chand.</li><li>2. Unit 3: Basic Electronics, Solid State, B. L. Theraja, S.Chand</li></ol>	
Reference Books for Practical	
<ol style="list-style-type: none"><li>1. B.Sc. Practical Physics by Harnam Singh and Dr. P.S. Hemne, S. Chand &amp; Co. Ltd., New Delhi (2000).</li><li>2. An Advanced Course in Practical Physics by D. Chatopdhyay, P.C. Rakshit, New Central Book Agency Pvt. Ltd (1990).</li><li>3. Advanced Practical Physics by M S Chauhan and S P Singh, Pragati Prakashan, Meerut (1984).</li></ol>	
Web Resources	
<ol style="list-style-type: none"><li>1. <a href="https://phys.libretexts.org">https://phys.libretexts.org</a></li><li>2. <a href="https://drait.edu.in/assets/departments/ECE/materials/18EC24_Basic_Electronics_Notes.pdf">https://drait.edu.in/assets/departments/ECE/materials/18EC24_Basic_Electronics_Notes.pdf</a></li></ol>	

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## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Subject Name: BS02AECHE1 English Language Skills-II

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	25	00	25	00

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02AECHE1
Course Title	English Language Skills-II
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

- To advance understanding of complex grammatical structures.
- To expand students' vocabulary with idioms and phrasal verbs.
- To improve analytical reading and higher-level writing skills.

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

- Use advanced grammar accurately in writing and speaking.
- Comprehend and utilize a broader range of vocabulary.
- Write essays and reports with a clear structure and argumentation.







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**School of Science**  
**B.Sc. (Chemistry) Programme**

## Reference Books

- Swan, Michael. Practical English Usage. Oxford University Press.
- McCarthy, Michael, and Felicity O'Dell. English Phrasal Verbs in Use. Cambridge University Press.
- Nunan, David. Second Language Teaching & Learning. Heinle & Heinle Publishers.

## Web Resources

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## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Subject Name:** BS02AECHE2 Scientific Communication Skills

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	25	00	25	00

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02AECHE2
Course Title	Scientific Communication Skills
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

- To develop effective communication skills tailored for scientific contexts
- To enhance presentation and public speaking skills for scientific topics
- To improve collaborative communication skills for scientific research and projects

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

- Communicate scientific ideas both verbally and in writing
- Deliver clear and engaging presentations on scientific topics
- Collaborate effectively in group discussions and research projects







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Unit 1: Scientific Communication</b> <ul style="list-style-type: none"><li>Fundamentals of Scientific Communication: Clarity, Precision, and Objectivity</li><li>Communicating Scientific Data: Graphs, Tables, and Figures</li><li>Writing Abstracts, Summaries, and Scientific Reports</li></ul>	15
II	<b>Unit 2: Presentation and Public Speaking</b> <ul style="list-style-type: none"><li>Techniques for Effective Scientific Presentations</li><li>Use of Visual Aids in Presentations</li><li>Public Speaking Skills: Clarity, Engagement, and Confidence</li></ul>	15
<b>Reference Books</b>		
<ul style="list-style-type: none"><li>Alley, Michael. The Craft of Scientific Writing. Springer.</li><li>Peat, Jennifer, et al. Scientific Writing: Easy When You Know How. BMJ Books.</li><li>Day, Robert A., and Barbara Gastel. How to Write and Publish a Scientific Paper. Cambridge University Press.</li></ul>		

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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:-** BS02SECHE1: Fundamentals of Computer and Office

Automation Packages-II

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
1	0	1	2	0.25	-	0.5	0.25

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02SECHE1
Course Title	Fundamentals of Computer and Office Automation Packages-II
Course Content Type (Th./Pr.)	Theory/Practical
Course Credit	2
Sessions+ Lab. Per Week	1+2*
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. To aware students about basic structure of computer and basic of Information technology.
2. Students can develop skills for effective use of Office Automation Tool.

### Prerequisites (if any)

Basic Understanding and Operating of Computer System

### Learning Outcomes

On the completion of this course, students will able to:

1. Infer organization of input/output, memory and processing devices.
2. Summarize the Information technology
3. Apply and analyze various features into the spreadsheet and database.

### Detailed Contents







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## Birsa Munda Tribal University

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### School of Science

#### B.Sc. (Chemistry) Programme

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Basic I/O Devices, Memory, Data Storage &amp; Processor</b> Type of input and output devices, Types of Memory (RAM→SRAM, DRAM, DDR etc., ROM→ROM, PROM, EPROM, EEPROM etc.), Types of magnetic devices (floppy disk, hard disk, magnetic tape etc.), storage mechanism for magnetic storage devices like tracks, sectors, clusters etc., other storage devices (USB Flash Drive, CD, DVD, blu ray disk etc.), Cloud storage like google drive, OneDrive etc., Types of processor (Dual core, Core 2 duo, i3, i5, i7 etc.)	15
II	<b>Information Technology:</b> Understanding the need of Information, Data, Knowledge, Difference between Data, Information and Knowledge <b>Office Automation Fundamentals</b> Introducing MS-Excel, formatting workbook, conditional formatting, Autofill and custom list, sorting data, filtering data, creating charts, summarize data using pivot table, working with basic functions and formulae, protecting data. Introducing MS-Access, creating database, working with tables, queries, forms and reports	15
<b>Text Book(s)</b>		
<b>Reference Books</b>		
1. Computer Fundamentals Concepts, System & Application By: P. K. Sinha Publisher: BPB 2. Introduction to Information Technology By: Turban, Rainer Publisher: Wiley 3. Fundamentals of Information Technology By: Mathew Anoop, S. Kavitha Murugesan Publisher: Narosa Publishing House 4. Microsoft Office 2019 for Dummies, Publisher: Wiley		
<b>Web Resources</b>		
1. <a href="https://edu.gcfglobal.org/en/topics/office/">https://edu.gcfglobal.org/en/topics/office/</a> 2. <a href="https://www.computer-pdf.com/tutorials-ms-office-basics">https://www.computer-pdf.com/tutorials-ms-office-basics</a> 3. <a href="https://www.tutorialspoint.com/excel/index.htm">https://www.tutorialspoint.com/excel/index.htm</a> 4. <a href="https://www.tutorialspoint.com/ms_access/index.htm">https://www.tutorialspoint.com/ms_access/index.htm</a>		
<b>Required Software(s) (if any)</b>		
MS-Office		







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## School of Science B.Sc. (Chemistry) Programme

### Practical(s) (if any)

#### List of Sample Practical

1. Prepare a mark sheet using appropriate formulae.
2. Insert car sales data into sheets and compare sales for men and women, using various different chart types.
3. Use the formatting tools to make your data look more professional and presentable.
4. Creates Range names and uses them in formulae.
5. Use a custom number format to change the appearance of dates/numbers.
6. Calculate parking fees using an IF function.
7. Use the inbuilt functions to calculate basic statistics from a list of data.
8. Create two different tables with country information now Create a query showing the countries in one table not in the other, and vice versa.
9. Use Make Table queries to separate a large table of data into several smaller ones.
10. Create Access queries that prompt the user for criteria.
11. Delete records from a database using Delete queries.
12. Use Make Table queries to create a backup of important data, and to quickly make copies of specific records.
13. Use the Auto form wizard to create a quick form for entering and viewing data
14. Create forms based on the one-to-many relationships in database.
15. Use the report wizard to quickly create detailed summary reports based on your data.
16. Design a report to list courses by Various Schools of BMTU.

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## School of Science B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS02SECHE2 Personality Development & Leadership Skill

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	25	-	25	-

Programmed Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02SECHE2
Course Title	<b>Personality Development &amp; Leadership Skill</b>
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. विद्यार्थीઓ વ્યક્તિત્વનો અર્થ સમજે.
2. વ્યક્તિત્વ વિકાસ વિશે પરિચય મેળવી સમજણ કેળવે.
3. વિધ્યાર્થીઓ વ્યક્તિત્વ વિકાસને સમજી જીવનમાં ઉતારી સ્વ-વ્યક્તિત્વનો વિકાસ કરે.
4. વિધ્યાર્થીઓને નેતૃત્વ વિશેનો ખ્યાલ અને મહત્વ સમજે.
5. વિધ્યાર્થીઓ નેતાના પ્રકારો અને નેતાના લક્ષણોથી અવગત થશે.
6. વિધ્યાર્થીઓ નેતા બનવા માટેની સમજ કેળવે.

### Learning Outcomes

1. વિધ્યાર્થીઓમાં વ્યક્તિત્વનો વિકાસ થાય અને સ્વ-વ્યક્તિત્વને ઓળખી શકે.
2. વ્યક્તિત્વ વિકાસની પાયાની બાબતોની સમજ મેળવી તેના જીવનમાં ઉતારશે.
3. નેતૃત્વનું મહત્વ સમજી નેતા બનવા માટેના ગુણો વિકસાવી શકે.
4. નેતાના પ્રકારો અને લક્ષણો વિશે સમજ મેળવી પોતાના જીવનમાં નેતા તરીકેની સમજ મેળવે.







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## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<ul style="list-style-type: none"><li>➤ व्यक्तित्वનો અર્થ</li><li>➤ વ્યક્તિ અને વ્યક્તિત્વ</li><li>➤ વ્યક્તિત્વની મુખ્ય બાબતો</li><li>➤ વ્યક્તિત્વને અસર કરતા પરિબળો</li><li>➤ વ્યક્તિત્વ વિકાસની પાયાની બાબતો</li></ul>	15
II	<ul style="list-style-type: none"><li>➤ નેતૃત્વનો અર્થ અને વ્યાખ્યા</li><li>➤ નેતૃત્વનું મહત્વ</li><li>➤ નેતૃત્વનાં પ્રકારો</li><li>➤ શૈલીઓ અને તેના ફાયદાઓ/ગેરફાયદા</li><li>➤ સારા નેતાના લક્ષણો</li></ul>	15
Reference Books		
<ol style="list-style-type: none"><li>1. વ્યક્તિત્વ વિકાસ-પ્રો. નેહા ડી રાવલ, ડૉ. ધર્મિષ્ઠા ગોહિલ</li><li>2. Leadership and management By A Chandramohan, Himalaya Publishing House.</li><li>3. વાણિજ્ય વ્યવસ્થા અને સંચાલન-ટી જે. રાણા, બી. એસ શાહ પ્રકાશન</li></ol>		
Web Resources		
<a href="https://baou.edu.in/assets/pdf/BCPDA210_slm.pdf">https://baou.edu.in/assets/pdf/BCPDA210_slm.pdf</a>		
Required Software(s) (if any)		
N.A		
Practical(s) (if any)		
N.A		

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## School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Name: - BS02SECHE3: Honeybee Farming**

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	50%	00	50%	00

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02SECHE3
Course Title	Honeybee Farming
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

This course is designed to acquaint the student with the broad field of beekeeping, Honeybee biology, and division of labour in bees and construction of bee hives.

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Understand the morphology, anatomy and life cycle of Honey Bee species.
2. Learn its social organization and social or solitary behavior.
3. Acquire knowledge about beekeeping tools and equipment.
4. Apply, practical and theoretical concept to identify species and casts of bees.
5. Get acquaint about properties and applications of Honey and its by-products.







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada  
Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>1. Introduction to Apiculture - scope, importance :</b> <ul style="list-style-type: none"><li>History of beekeeping: Definition, Beekeeping worldwide and In India.</li><li>Traditional beekeeping and Modern beekeeping.</li></ul> <b>2. Honey Bee morphology, Anatomy and Life cycle :</b> <ul style="list-style-type: none"><li>Basic concepts of morphology of Honey bees</li><li>Types of honey bees- indigenous, exotic, Species of honey bees. Origin, systematics and distribution of honey bees.</li><li>Social organization in honey bees: Colony life and social organization – Queen, drone, worker.</li><li>Study of Social behavior of honey bee: Attack, Bee Dance</li><li>Bee enemies – Enemy: Mites, Wax Moths, Ants, Bee Eaters, Garden Lizards, Bears.</li></ul>	15
II	<b>1. Beekeeping: Tools and Equipment:</b> <ul style="list-style-type: none"><li>Basic requirements for beekeeping start up</li><li>BIS standard Tools used in apiculture.</li><li>Introduction to types of bee boxes and Their Parts</li></ul> <b>2. Honey Processing and Bee Hive Products :</b> <ul style="list-style-type: none"><li>Honey - its properties and application in various fields</li><li>Honey extraction &amp; handling - Quality control standards, Processing of honey.</li><li>Other valuable by-products of honey bees – Wax, Bee venom &amp; Royal jelly extraction.</li></ul>	15

### Text Book(s)

1. Economic Zoology, G.S. Shukla, 2009 Rastogi Publications







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## School of Science B.Sc. (Chemistry) Programme

### Reference Books

1. Anatomy of Honey bee by R.E. Snodgrass.
2. Bees and Bee keeping in India by D.P. Abrol, Kaluani Publications.
3. The hive & the Honey Bee, Dadant Publication, America.
4. Beekeeping in India, 1962, 82, by Sardar singh, ICAR, New Delhi.
5. Beekeeping by E.F. Phillips. Agrobios (India) Publication.
6. Handbook of Beekeeping by Dharamsingh, Devendra Pratap Singh, Agrobios.

### Web Resources

1. Vocational : Bee keeping :: <https://www.classcentral.com/course/swayam-vocational-bee-keeping17839/course/swayam-vocational-bee-keeping-17839> (Swayam Course)
2. Beekeeping parts, tools, & equipment: <https://www.classcentral.com/course/youtube-beekeeping-parts-toolsequipment-59050/course/youtube-beekeeping-parts-tools-equipment-59050> (Swayam Course).

**L::** Lecture, **T::** Tutorial , **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation











# बिरसा मुंडा ट्रायबल युनिवर्सिटी

## Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

### School of Science

### B.Sc. (Chemistry) Programme

**Subject Code & Name:** - BS02VACHE1 Introduction to National Service Scheme

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	25	-	25	-

Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02VACHE1
Course Title	Introduction to National Service Scheme
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. To know the basic concept, Philosophy, Objectives and various advisory Committees of NSS.
2. To understand the basic programmes and activities of NSS.
3. Understand themselves in relation to their community.
4. Identify the needs and problems of the community and involve them in problem solving process
5. To develop capacity to meet emergencies and natural disasters and to practice national integration and social harmony.

### Learning Outcomes

On the Completion of this course, students will able to:

1. To know about History & Concept of NSS
2. Understand the community in which they work.
3. Understand themselves in relation to their community.
4. It has provided diversified opportunities to students in schools/colleges and universities to develop their personality through community service.







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Introduction of national service scheme:</b> Introduction of National Service Scheme, • History & Concept of NSS, Objectives, Symbol, NSS Badge, Motto, NSS Songs, NSS Day, NSS Advisory Committees at various levels <b>NSS programmes and activities:</b> Basic concepts and components, NSS programmes and activities	15
II	<b>Special camping programme:</b> Contributions of special camping programme, Planning and preparation of special camping programme, Financial pattern of expenditure for special camping programme <b>Administrative structure:</b> at national level, at state level, at university level & at +2 level <b>NSS advisory committees</b>	15
<b>Reference Books</b>		
1. NATIONAL SERVICE SCHEME MANUAL (Revised)		
<b>Web Resources</b>		
1. <a href="https://nss.gov.in/">https://nss.gov.in/</a>		

**L::** Lecture, **T::** Tutorial, **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

**Subject Code& Name:** - BS02VACHE2 Tribal Culture and Communication

### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	-	2	25	-	25	-

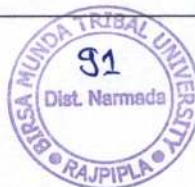
Programme Name	B.Sc. (Chemistry)
Semester	II
Course Code	BS02VACHE2
Course Title	Tribal Culture and Communication
Course Content Type (Th./Pr.)	Theory
Course Credit	2
Sessions+ Lab. Per Week	2
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

### Learning Objectives

1. આદિવાસી સંસ્કૃતિનો પરિચય મેળવે
2. આ એકમનો અભ્યાસ કર્યા બાદ વિદ્યાર્થી આદિવાસી સંસ્કૃતિના વિષયને સળતાથી સમજી શકશે
3. આદિવાસી ઇતિહાસ અને વિકાસ તેમજ આદિવાસી જાતિ વગેરેની વિગતવાર માહિતી જાણી શકશે .
4. ગુજરાતની આદિવાસી બોલીઓ અને વારસા વિશે જાણી શકશે .

### Learning Outcomes

1. આદિવાસી સંસ્કૃતિનો પરિચય મેળવે .
2. આ એકમનો અભ્યાસ કર્યા બાદ વિદ્યાર્થી આદિવાસી સંસ્કૃતિનાં વિષયને સળતાથી સમજશે .
3. આદિવાસી ઇતિહાસ, વિકાસ તેમજ આદિવાસી જાતિ વગેરેની વિગતવાર માહિતી જાણશે.
4. ગુજરાતની આદિવાસી બોલીઓ અને વારસા વિશે જાણી શકશે.







# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<p>ગુજરાત રાજ્યમાં આદિવાસી સંસ્કૃતિ અને વિકાસની સક્ષિપ્ત ઝાંકી</p> <ul style="list-style-type: none"><li>➤ આદિજાતિનો અર્થ અને વ્યાખ્યા</li><li>➤ આદિવાસી જાતિઓનો ઇતિહાસ</li><li>➤ આદિવાસી વિકાસ - ઇતિહાસ</li><li>➤ રોજિંદા જીવન સાથે વણાયેલી આદિવાસી કળા</li><li>➤ સગાઈ રીત રિવાજો</li><li>➤ આદિવાસી દ્રશ્ય સંસ્કૃતિ</li><li>➤ સામાજિક ઉત્સવો સંલગ્ન નૃત્યો અને વાદ્યો</li></ul>	15







# બિરસા મુંડા ટ્રાયબલ યુનિવર્સિટી Birsa Munda Tribal University

રાજપિપલા, જિ. નર્મદા Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

II	<p>ગુજરાતનાં આદિવાસી લોકસમુદાયનો પરિચય</p> <ul style="list-style-type: none"><li>➤ પરિચયાત્મક</li><li>➤ આદિવાસી લોકબોલી</li><li>➤ ખેતી, જંગલ, સામાજિક,</li><li>➤ જાત માહિતી</li><li>➤ સગાં સંબંધી</li><li>➤ ખોરાક, પોશાક, ઘરેણાં તથા ગામ વિશેની સામાન્ય માહિતી.</li></ul> <p>આદિવાસી જાતિનો પરિચય</p> <ul style="list-style-type: none"><li>➤ પાડવી</li><li>➤ રાઠવા</li><li>➤ ચૌધરી</li><li>➤ ગામીત</li><li>➤ ભીલ</li><li>➤ વળવી</li><li>➤ વસાવા</li><li>➤ કથોડિયા</li><li>➤ નાયકા</li></ul>	15
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### Text Book(s)

1. આદિવાસી લોકમેળા : શંકરભાઈ તડવી ,આદિવાસી સંગ્રહાલય, છોટાઉદેપુર.
2. ગુજરાતનાં લોકમેળા અને ઉત્સવ :મૃદુલા મહેતા , યુનિ ગ્રંથ નિર્માણ બોર્ડ ,અમદાવાદ.
3. ગુજરાતનાં લોકમેળા જોરાવરસિંહ જાદવ ,ઈમેજ પ્રકાશન ,અમદાવાદ .
4. ગુજરાતની આદિવાસી લોકસંસ્કૃતિ: ડૉ.અરૂણ વાઘેલા.





# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

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Established by Tribal Development Department, Govt. of Gujarat

## School of Science B.Sc. (Chemistry) Programme

### Reference Books

1. गुजरातની લોક સંસ્કૃતિ : હસુમતિબેન સેડાણી , યુનિ ગ્રંથનિર્માણ બોર્ડ , અમદાવાદ .
2. આદિવાસી લોકમેળા : શંકરભાઈ તડવી , આદિવાસી સંગ્રહાલય, છોટાઉદેપુર.
3. ગુજરાતનાં લોકમેળા અને ઉત્સવ : મૃદુલા મહેતા , યુનિ ગ્રંથનિર્માણ બોર્ડ , અમદાવાદ.
4. ગુજરાતનાં લોકમેળા જોરાવરસિંહ જાદવ , ઈમેજ પ્રકાશન , અમદાવાદ.
5. ગુજરાતની આદિવાસી લોકસંસ્કૃતિ: ડૉ . અરૂણ વાઘેલા
6. ભીલી સાહિત્ય : એક અધ્યયન - હસુ યાજ્ઞિક, ગુર્જરી ટ્રાયબલ ફાઉન્ડેશન, અંબાજી

### Web Resources

1. <http://www.kamat.com/databashe/content/adivasis/>

### Required Software(s) (if any)

N/A

### Practical(s) (if any)

N/A

**L::** Lecture, **T::** Tutorial , **P::** Practical

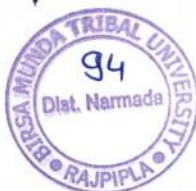
**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation







# **CURRICULUM AND CREDIT FRAMEWORK**

**For**

**B.Sc. Honours/ Honours with Research in  
Chemistry**

**As per NEP 2020**

**(To be Effective from June, 2024)**





## **ORDINANCES AND REGULATIONS:**

Ordinances & Regulations for the Degree of Bachelor of Science (As Per NEP 2020) are as under:

### **Ordinances:**

#### **Ord. – 1:**

Candidate for admission to the Bachelor of Science must have passed standard 12th or equivalent examination in respective stream from Gujarat Higher Secondary Board or any other board.

**Ord – 2:** Candidate who have passed an equivalent examination from any other board or examining body and is seeking admission to the B.Sc. will be required to provide necessary eligibility certificate.

#### **Ord. – 3:**

### **Definitions of Keywords:**

#### **1. Academic Year:**

An Academic Year is divided into two semesters and a semester of minimum 15 weeks comprises 90 working days.

**2. Programme:** An educational programme leading to award of the Certificate, Diploma, Bachelor, Bachelor (Honours) or Bachelor (Honours with Research).

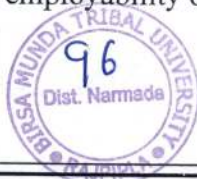
**3. Course:** Usually referred to, as 'paper/subject' is a component of a program. The courses should define learning activities, objectives and learning outcomes. Types of courses / activities constitute the programs of study comprise lectures outreach activities / Practical / Case Study / Group Discussion / Quiz / Project work/ Viva / Seminars / Assignment / Internship / Presentations / Research Project etc. or a combination of some of these.

**4. Major & Minor Discipline Course:** Major discipline is grouping of courses of main focus and the degree will be awarded in that discipline. Students should secure the prescribed number of credits (about 50% of total credits) through core courses in the major discipline. Minor discipline helps a student to gain a broader understanding beyond the major discipline

**5. Multidisciplinary Courses:** These courses are intended to broaden the intellectual experience and form part of other disciplines.

**6. Ability Enhancement Courses:** The courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills, that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity.

**7. Skills Enhancement Courses:** These courses are aimed at imparting practical skills, hands-on training, soft skills, etc., to enhance the employability of students.





**8. Value-Added Courses / Indian Knowledge System:** The course aims at enabling the students to acquire and demonstrate the knowledge and understanding of contemporary India with its historical perspective, the basic framework of the goals and policies of national development, and the constitutional obligations with special emphasis on constitutional values and fundamental rights, ethics and duties.

**9. Summer Internship/ Apprenticeship:** Students will have to undergo Internships / Apprenticeships in a firm, industry, or organization or Training in labs with faculty and researchers in their own or other HEIs/research institutions during the summer term. Students will be provided with opportunities for internships with local industry, business organizations, health and allied areas, local governments (such as panchayats, municipalities). Parliament or elected representatives, media organizations, artists, crafts persons, and a wide variety of organizations so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

**10. Vocational Courses:** Vocational Education and Training will form an integral part of the undergraduate programme to impart skills along with theory and practical.

**11. Research Dissertation:** Students choosing a 4-Year Bachelor's degree (Honours with Research) are required to take up research dissertation under the guidance of a faculty member. The students are expected to complete the Research Dissertation in the eighth semester.

**12. Credit:** It determines the number of hours of instruction required per week over the duration of a semester. One credit is equivalent to one hour of teaching per week, One credit for tutorial work means one hour of engagement per week, A one-credit course in practical or lab work, community engagement and services, and fieldwork in a semester mean two-hour engagement per week, A one-credit of Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service means two-hour engagements per week.

**13. Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Ab.

**14. Credit Point:** It is the product of grade point and number of credits for a course.

**15. Semester Grade Point Average (SGPA):** It is a measure of performance or work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

**16. Cumulative Grade Point Average (CGPA):** it is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.





**Ord. – 4 :** B.Sc. Degree programme is of three/four academic year's duration, consisting of six/eight semesters, which will be required to be completed within **7 years** from the date of his/her first admission in the First Semester. Students are permitted to take a break or exit with a UG certificate / UG Diploma / UG Degree are permitted to re-enter within three years and complete the degree programme. But total duration for completing the programme shall not exceed 7 years.

**Ord. – 5:** B.Sc. Three years (six semesters)/ Four years (eight semesters) Degree programme is a regular fulltime programme. A student can pursue two full time academic programmes in physical mode provided that in such cases, class timing for one programme do not overlap the class timings of the other programme. Students can pursue two academic programmes, one in full time and physical mode and another in Open and Distance Learning (ODL)/ Online mode; or up to two ODL/Online programmes simultaneously.

**Ord. – 6:** No candidate will be admitted to any semester end examination unless it is certified by the principal that he/she has attended the course of study to the satisfaction of the principal of the school.

**Ord. – 7:** Candidate desirous of appearing at any semester end examination of the said programme must forward their application in the prescribed form to the University through the principal on or before the date prescribed for the purpose under the relevant ordinances.

**Ord. – 8:** No candidate will be permitted to reappear at any semester end examination, which he/she has already passed. The marks of successfully completed course will be carrying forwarded for the award of class.

**Ord. – 9:** Medium of instruction is English/Gujarati.

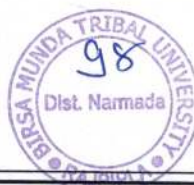
**Ord. – 10:** B.Sc. Programme of the University as per NEP 2020 is implemented along with the Continuous and Comprehensive Evaluation (CCE) and minimum attendance is at least 75% attendance.

**Ord. – 11:**

The main aim of the NEP-2020 is to facilitate Multiple Entry and Exit options with UG certificate/ UG diploma/ or degree, depending upon the number of credits secured. The Entry and Exit options for students, who enter in the B.Sc. programme, are as follows:

**1ST YEAR:**

**Entry 1:** The entry requirement for Level 4.5 is Higher Secondary School Leaving Certificate obtained after the successful completion of Grade 12 and should meet the entrance requirements, availability of seats, admission regulations of the BMTU. A programme of study leading to entry into the first year of the Bachelor's degree is open to those who have met the eligibility requirements, including specified levels of attainment at the higher secondary level of education specified in the programme admission regulations. Admission to the Bachelor degree programme of study is based on the evaluation of documentary evidence (including the academic record) of the applicant's ability to undertake and complete a Bachelor's degree programme.





**Exit 1: UG Certificate:** A UG certificate shall be awarded if a student exit at the end of year one (two semesters) after successfully securing 44 credits. The student also needs to secure 4 additional credits in summer internship/Apprenticeship in the major discipline or multidiscipline offered course. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

## **2ND YEAR:**

**Entry 2.** The entry requirement for Level 5.0 is a Certificate in Science obtained from any University after completing the first year (two semesters) of the undergraduate programme and meet the entrance requirements, availability of seats and admission regulations of the BMTU.

**Exit 2: UG Diploma:** A UG diploma shall be awarded if a student exit after two years (four semesters) after successfully securing 88 credits from level 4.5 to 5.0, with 44 credits at level 5.0. The student also needs to secure 4 additional credits in summer internship/Apprenticeship in major discipline or multidiscipline offered course. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.

## **3RD YEAR:**

**Entry 3.** The entry requirement for Level 5.5 is a UG Diploma obtained from any institution after completing two years (four semesters) of the undergraduate and meet the entrance requirements, availability of seats and admission regulations of the BMTU.

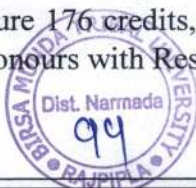
**Exit 3:** On successful completion of three years, the relevant Bachelor of Science Degree shall be awarded (Level 5.5). A Bachelor's degree requires minimum 132 credits from levels 4.5 to 5.5, with minimum 44 credits at level 4.5, minimum 44 credits at level 5.0, and minimum 44 credits at level 5.5.

## **4TH YEAR:**

**Entry 4.** A student seeking admission to a 4-year Bachelor of Science degree (Honours/Honours with Research) (Level 6.0) in a specified field of learning, must have completed all requirements of the relevant three-year Bachelor of Science degree (Level 5.5) and meet the entrance requirements, availability of seats and admission regulations of the BMTU. After completing the requirements of a three-year Bachelor's degree programme, candidates shall be allowed to continue studies in the fourth year of the undergraduate programme to pursue and complete the Bachelor's degree in Honours /Bachelor's degree in Honours with Research.

**Exit 4: 4-year UG Degree (Honours):** A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 176 credits and have satisfied the credit requirements including 12 credits from O-J-T or equivalent courses.

**4-year UG Degree (Honours with Research):** They should do a research dissertation under the guidance of a faculty member of the University. The research dissertation will be in the major discipline. The students, who secure 176 credits, including 12 credits from a research dissertation, are awarded UG Degree (Honours with Research).





### Summary of Multiple Exit System:

1	<b>UG Certificate</b>	UG Certificate will be awarded when a student exits after completion of semester 1 and semester 2 with 44 credits along with successfully completion of work based vocational course of 4 credits Online/Offline or internship/Apprenticeship
2	<b>UG Diploma</b>	UG Diploma will be awarded when a student exits after completion of semester 1 to semester 4 with 88 credits along with successfully completion of work based vocational course of 4 credits Online/Offline or internship /Apprenticeship
3	<b>UG Degree</b>	Bachelor's degree will be awarded when a student exits after completion of semester 1 to semester 6 with 132 credits.
4	<b>UG Degree Honours</b>	Bachelor's degree (Honours) will be awarded when a student exits after completion of semester 1 to semester 8 with 176 credits. including <b>12 credits from O-J-T (On the Job Training) or equivalent courses</b>
5	<b>UG Degree Honours with Research</b>	Bachelor's degree (Honours with Research) will be awarded when a student exits after completion of semester 1 to semester 8 with 176 credits including <b>12 credits from a research dissertation</b>

### Ord. – 12:

A regular candidate having obtained minimum marks for passing in **CCE (i.e. 9 out of 25 & 18 out of 50)** and **SEE (i.e. 9 out of 25 & 18 out of 50)** or more but fails to obtain minimum **36%** aggregate marks will be required to re-appear in both the component viz CCE and SEE. In such a case candidate will not be required to keep term for the respective semester. The marks of the examination in which the student has passed will be carried forward.

No.	<b>CCE (Continuous &amp; Comprehensive Evaluation)</b>	<b>SEE (Semester End Evaluation)</b>	<b>Result</b>	<b>Require to Appear in Exam</b>
1	Pass	Pass	Pass	N. A.
2	Pass	Fail	Fail	SEE Only
3	Fail	Pass	Fail	CCE Only
4	Fail	Fail	Fail	Both (CCE & SEE)



## Regulations:

### R.1

The new curriculum as per NEP 2020 is not only student centric in the teaching-learning processes but also in their evaluation process. The evaluation consists of the following two components: The component consists of Continuous and Comprehensive Evaluation (CCE) and the second component consists of the Semester end examination. The division of marks between the two shall be 50:50 in the NEP 2020; the evaluation process shall follow the norm that the faculty, who teaches the course, shall conduct the Continuous and Comprehensive Evaluation (CCE). **The concerned faculty shall be accountable for transparency and reliability of entire evaluation of the student in the concerned Course**

In each course, every credit carries 25 marks, of which 50% marks is assigned for CCE and rest 50% marks for SEE.

Sr. No.	Evaluation	4 credit subjects (Marks)	2 credit subjects (Marks)
1	CCE (50%)	Final marks 50	25
2	SEE (50%)	Final marks 50	25
	<b>Total</b>	<b>100</b>	<b>50</b>

**Note:-** Total Theory(CCE+SEE) 150 Marks converted for **75 Marks** and Total Practical (CCE+SEE) 50 marks converted for **25 marks**

### R-2

**Continuous and Comprehensive Evaluation (CCE):** Subject-wise CCE will be undertaken by the concerned faculty member. The mode of evaluation will be decided by the faculty member concerned with the subject.

Normally CCE Theory includes Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, tutorials, slip tests (announced/ surprised), attendance etc. or any combination of these. The students are expected to submit their answer scripts/ reports of internal evaluation within the stipulated time. Failure to do so may result in the script not being valued.

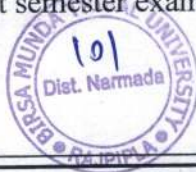
CCE PWE includes Laboratory practical work, project work, viva simulation exercise work etc

Another part of CCE consists of Mid Semester Examination, which is compulsory for all students. It can be done in a scheduled manner. **The duration of the mid-term evaluation shall be one hour.**

### R-3

**Semester End Evaluation (SEE):** The SEE carries 50% of the marks assigned to a course. **SEE shall be of 2½ hours for 4 credit course (75 Marks) and 1½ hours in case of 2 credit courses.** The controller of the examination will conduct this examination. Paper setting and evaluation will be done by the internal and external examiners. This examination shall be conducted as per a schedule which shall be notified in advance.

The backlog exam will be conducted twice a year just after the result declared of the semester evaluation. Students shall have a second chance to clear their backlog and avoid the burden to carry forward the backlog with the next semester exam.





Appearance in all the evaluations is mandatory and no exemption can be granted except in the following case:

1. In case of inability to attend the exam due to reasons considered genuine by the controller of examination in consultation with the Registrar/VC.
2. In case of medical emergency, a certificate from the registered medical practitioner must be produced before the commencement of exams. The authority will then take final decision on the recommendation for exemption.

#### **R-4**

**Eligibility Criteria to appear in SEE:** To be able to appear for the SEE, a student must comply with the following conditions:

1. Should have at least 75% of attendance in all the courses put together
2. Should have at least 70% of attendance in each course/subject
3. Should not have any disciplinary proceedings pending against him/her
4. Should have no pending due

#### **R-5**

**Practical Examination:** Practical examination (wherever applicable) shall be conducted at the end of every semester. The examination shall be conducted as per norms decided by the concerned authority of the University

#### **R-6**

**Research Dissertation work:** The research dissertation work and the Supervisor shall be assigned to the student by the concerned school well in advance. Evaluation of dissertation will be done by the subject experts appointed by the university. Maximum marks of the dissertation will be 200.

#### **R-7**

##### **Letter Grades and Grade Points**

The Semester Grade Point Average (SGPA) is computed from the grades as a measure of the student's performance in a given semester. The SGPA is based on the grades of the current term, while the Cumulative Grade Point Average (CGPA) is based on the grades in all courses taken after joining the programme of study.

The relative grading system provides the relative performance of a student to a group/class wherein the student is ranked in a group/class based on relative level of achievements. BMTU may also mention the marks obtained by the students in each course and a weightage average of marks on the Grade sheet for the benefits of the students.





Sr. No.	Letter Grade	Grade Point	Marks (In %)
1	O (outstanding)	10	96.0-100
2	A+ (Excellent)	9	86.0-95.9
3	A (Very Good)	8	76.0-85.9
4	B+ (Good)	7	66.0-75.9
5	B (Above Average)	6	56.0-65.9
6	C (Average)	5	46.0-55.9
7	P (Pass)	4	36.0-45.9
8	F (Fail)	0	Below 36.0
9	Ab (Absent)	0	Absent

**Minimum passing marks for each pattern of evaluation (formative and summative):**

Maximum Marks	Minimum Passing Marks
25	9
50	18
100	36

**R-8**

### **Computation of SGPA and CGPA**

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

1. The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\text{SGPA (Si)} = \Sigma(C_i \times G_i) / \Sigma C_i$$

Where  $S_i$  is the SGPA for  $i^{\text{th}}$  course,  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

### **Example for Computation of SGPA**

Sem	Course	Credit	Letter Grade	Grade point	Credit Point (Credit x Grade)
I	Major Course 1	4	A	8	4 X 8 = 32
I	Major Course 2	4	B+	7	4 X 7 = 28
I	Minor Course 3	4	B	6	4 X 6 = 24
I	MDC 4	4	O	10	4 X 10 = 40
I	AEC 5	2	C	5	2 X 5 = 10
I	SEC 6	2	B	6	2 X 6 = 12
I	IKS 7	2	A+	9	2 X 9 = 18
		<b>22</b>			<b>164</b>
<b>SGPA :-</b>					<b>164/22 = 7.45</b>





2. The Cumulative Grade Point Average (CGPA) is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA} = \Sigma(C_i \times S_i) / \Sigma C_i$$

Where  $S_i$  is the SGPA of the  $i^{\text{th}}$  semester and  $C_i$  is the total number of credits in that semester.

#### Example for Computation of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credit: 22 SGPA: 6.82	Credit: 22 SGPA: 7.8	Credit: 22 SGPA: 5.6	Credit: 22 SGPA: 6.0	Credit: 22 SGPA: 6.3	Credit: 22 SGPA: 8.0
$\text{CGPA} = (22 \times 6.82) + (22 \times 7.8) + (22 \times 5.6) + (22 \times 6.0) + (22 \times 6.3) + (22 \times 8.0) / 132$ $\text{CGPA} = 149.6 + 171.6 + 123.2 + 132 + 138.6 + 176 / 132$ $\text{CGPA} = 891 / 132$ $\text{CGPA} = 6.75$					

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the grade sheet. The grade sheet may issue for each semester based on SGPA and CGPA and consolidated grade sheet indicating the performance in each semester.

#### R-9

##### Percentage Calculation

The percentage calculation will be on the basis as below

$$\text{Percentage} = \frac{\text{Total Marks Obtained in all the semesters} \times 100}{\text{Grand Total of Maximum Marks of all the semesters.}}$$

#### R-10

##### Award of Class:

A candidate who become eligible for the award of Bachelor of Science Honours / Honours with Research Degree shall be placed in one of the following classes based on Marks.

Sr. No.	Range of Marks	Description/Class
1	$\geq 70\%$ and $\leq 100\%$	Distinction
2	$\geq 60\%$ and $< 70\%$	First Class
3	$\geq 48\%$ and $< 60\%$	Second Class
4	$\geq 36\%$ and $< 48\%$	Pass Class
5	$< 36\%$	FAIL

#### R-11

If candidates who have failed in all the courses/papers of the semester are eligible to enter in next semester till the last semester. The result of the last semester shall not be declared (kept withheld) unless and until the candidate clears all the courses/papers of a programme.

