

B.Sc. Sem. I

Teaching/Exam Scheme

W.e.f.: 1st April'22

Sr. No.	Course Code	Category of course	Course title	Hours Per week			Tot. con. hrs	Cr edits	E	M	I	V	Total Marks
				L	T	P							
1	BC2101	Foundation Compulsory	English-I	2	-	-	2	2	70	30	-		100
2	BC2102	Core Course	Chemistry-I	4	-	4	8	6	70	30	30	70	200
3	BC2103	Core Course	Physics-I	4	-	4	8	6	70	30	30	70	200
4	BC2104	Core Course	Bio-Science-I	4	0	4	8	6	70	30	30	70	200
5	BC2105	Core Course	Mathematics-I	4	2	0	6		70	30	-	-	100
5	BC2106	Generic Elective	To be selected	2	-	-	2	2	70	30	-		100
6	BC2107	Foundation - Elective	To be selected	-	-	-	-	-	-	-	-		-
			Total	16	0/2	12	28/26	22	350	150	90	210	800/700

Generic Elective	1. Disaster Management 2. Environmental Studies 3. Green Chemistry
Foundation Elective	1. NCC 2. NSS 3. Yoga

* If Students will opt for Bio-Science-I course (BC2104), Total marks will be 800 and if students will opt for Mathematics-I course (BC2105) total marks will be 700

Bachelor of Science
Course Code: BC2101
Course Name: English-I
Semester: I

Type of course: Foundation Compulsory

Prerequisite: Zeal to learn the subject.

Rationale: At the end of the course, students will have knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	-	-	2	70	30	-	-	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Parts of Speech: Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions. Conjunctions & Interjections, Knowledge of Subject, Object and Compliment of the Verb, Verbal's – Infinitive, Gerund and Preposition	8
2	Prepositions of Time and Place: Contextual teaching of prepositions of time - on, in, at, since, for, ago, before, to, past, to, from, till/until, by Prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, though, to, into, towards, onto, from	6
3	Phrases and Clauses: Basic definitions of clauses and phrases, Focus on Relative Pronouns, Use in sentences as relative clauses	10
SECTION-B		
4	Sentence types and Transformation of sentences: Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, Complex sentences, Simple sentences, Degrees of Comparison	8
5	Word formations: Affixes- Prefixes and Suffixes, Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs, Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, Adverbs to Verbs	10
6	Paragraph Writing & Punctuation: Descriptive Paragraph on related topic Use of the comma, full stop, Semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	6

Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Essential English Grammar with Answers by Raymond Murphy
2. Communication Skills by Pushplatha & Sanjay Kumar
3. English Grammar by Annie Brinda (Cambridge University Press)

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Present basic sentences in English.	20%
CO-2	Construct grammatically correct sentences in English	15%
CO-3	Grammatically correct English sentences in everyday situations.	15%
CO-4	Connect with varied English vocabulary in everyday situations confidently	20%
CO-5	Relate themselves orally using simple English.	10%
CO-6	Assess reading and validate lifelong learning in English	20%

List of Open Source Software/learning website:

- <http://www.free-english-study.com/>
- <http://www.english-online.org.uk/course.htm>
- <https://www.grammar-quizzes.com/noun-forms.html>

Bachelor of Science
Course Code: BC2102
Course Name: Chemistry-I
Semester: I

Type of course: Core course

Prerequisite: Should have fundamental knowledge of physical, organic and inorganic chemistry and its relevant Properties.

Rationale: At the end of the course, students will have knowledge about bonding, various formulas, Stereochemistry of compounds, Solid state properties, Kinetics, Periodicity and hydrocarbons.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	-	4	6	70	30	70	30	200

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Chemical Bonding: Molecular Orbital theory ; LCAO method, Bonding molecular orbital, anti-Bonding molecular orbital and nonbonding molecular orbital, bond order, magnetic properties and molecular orbital energy level diagram of Heterodiatomic molecules : CO and NO, VSEPR theory	6
2	(A) Empirical formula. Molecular formula, and Structural formula: Determination of empirical formula and its relation with molecular formula determination of molecular weight of (a) organic acid by titration and silver salt method and (b) organic base by chloroplatinate method and its limitations. Determination of molecular formula of gaseous hydrocarbons by Explosion method , Numerical example (B) Alkanes and Cycloalkanes: Alkanes: nomenclature, sources, Methods of formation with special reference to Wurtz reaction, Kolbe reaction and decarboxylation of carboxylic acids. Physical properties and chemical reactions. Cycloalkanes: nomenclature, methods of formation chemical reactions, Baeyer's strain theory and its limitations, Theory of stainless ring.	12
3	Solid State: Definition of space lattice, unit cell, Laws of crystallography - Law of constancy of interfacial angles Types of crystal, packing and voids. X-ray diffraction by crystals. Derivation of Bragg equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).	6
SECTION-B		

4	Periodic properties: Definition of atomic and ionic radii, ionization energy, electron affinity and electron negativity, S block elements, Comparative study, diagonal relationship, silent features of hydrides, solvation and complexation and tendencies including their function in bio systems.	6
5	Stereochemistry of Organic Compounds: Isomerism, Optical activity, Chiral and achiral molecules, Optical isomerism of tartaric acid, Enantiomers, diastereomers (Threo & Erythro), Meso compounds Resolution of Enantiomers, inversion retention and racemization, Geometrical Isomerism: Alkene derivative & oximes E & Z system of nomenclature, Relative and absolute configuration, sequence rules. D & Land R & S system of nomenclature.	8
6	Chemical Kinetics: Chemical kinetics and its scope, rate of reaction, factors affecting rate of reaction: temperature, concentration, pressure, solvent, light and catalyst, Molecularity of reaction, Classification of chemical reaction, Order of reaction with illustration (first order, second, Order, third order, zero order, pseudo first order) reaction, Second order (a=b), half-life and mean life., Methods of determining the reaction rate: differential method- integration method- half-life period method- isolation method- graphical method, Radioactive decay as first order phenomenon; Conductometry method for determination of reaction rate constant(with example of saponification of ethyl acetate) , Numericals.	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Physical chemistry by Peter Atkins
2. Essentials of physical chemistry by A. S. Bhal and G. D. Tuli,
3. Principles of Physical chemistry by Puri, Sharma and Madan
4. Inorganic chemistry by Wahid Malik, G. D. Tuli, R. D. Madan;
5. Textbook of Organic Chemistry Rakesh K. Parashar, V.K. Ahluwalia
6. "Stereochemistry Of Organic Compound " by Tyagi
7. A Textbook of Inorganic Chemistry by Anil Kumar de.

List of Practical/ tutorials: (Practical's – 10)

A. Organic Qualitative Analysis

B. Volumetric Exercise

1. Volumetric titration between H_2SO_4 , NaHCO_3 and HNO_3
2. Volumetric titration between KMnO_4 , $\text{H}_2\text{C}_2\text{O}_4$ and KOH
3. Volumetric titration between KMnO_4 , FeSO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$
4. Volumetric titration between $\text{K}_2\text{Cr}_2\text{O}_7$, $\text{Fe}(\text{NH}_4)_2\text{SO}_4$ and KMnO_4
5. Volumetric titration between $\text{H}_2\text{C}_2\text{O}_4$, KMnO_4 and FeSO_4

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Examine the synthesis of different compounds by help of stereochemistry	20%
CO-2	Construct the way of a reaction proceeds and kinetics in details.	15%
CO-3	Calculate the empirical, Structural formula to gain the information of molecule.	15%
CO-4	Classify the elements by their properties to categories their character.	20%
CO-5	Construct the Physical properties and chemical reactions of alkanes and cycloalkanes.	10%
CO-6	Explain the various theory on basis of chemical and physical properties.	20%

List of Open Source Software/learning website:

- <https://www.library.qmul.ac.uk/subject-guides/chemistry/useful-websites/>
- https://blog.feedspot.com/chemistry_websites/
- <https://www.rsc.org/periodic-table>

Bachelor of Science
Course Code: BC2103
Course Name: Physics-I
Semester: I

Type of course: Core Course

Prerequisite: Should have fundamental knowledge of Mechanics, Optics, Vector and its relevance Properties.

Rationale: At the end of the course, students will have knowledge about Mechanics, Properties of matter, Thermodynamics, Vectors, Electrostatics and Geometrical Optics

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	-	4	6	70	30	70	30	200

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Mechanics: Projectile motion, Projectile motion Analyzed, Uniform circular motion, Relative motion in one dimension, relative motion in two dimension, Newtonian mechanics, Newton's first law, Force, mass, Newton's second law, some particular forces, Newton's third law, Applying Newton's laws. Torque revisited, angular momentum, Newton's second law in angular form, the Angular momentum of a system of particles, Angular momentum of a rigid body rotating about a fixed axis, conservation of angular momentum, Moment of inertia and its physical significance-radius of gyration, expression for the moment of inertia, torque, general theorems on moment of inertia	8
2	Properties of Matter (Elasticity): Introductory, load, Stress and strain, Hooke's law, factors affecting elasticity, three types of elasticity, equivalence of a shear to a compression and an extension at right angles to each other, shearing stress equivalence to an equal linear tensile stress and an equal linear compressive stress at right angles to each other, deformation of a cube-bulk modulus, modulus of rigidity, Young's modulus, relation connecting elastic constants, Poisson's ratio. Relations for K and η in terms of Poisson's ratio, limiting value of σ , twisting couple of a cylinder, variation of stress in a twisted cylinder, Torsional pendulum, determination of the coefficient of rigidity.	8
3	Thermodynamics: Temperature, the zeroth law of thermodynamics, Temperature and heat, the absorption of heat by solids and liquids, a closer look at heat and work, the first law of thermodynamics, some special cases of first law of thermodynamics, heat transfer mechanisms	8

	Pressure, temperature and rms speed, translational kinetic energy, mean free path, the distribution of molecular speed, the molar specific heats of an ideal gas, degrees of freedom and molar specific heat, a hint if quantum theory, the adiabatic expansion of an ideal gas	
SECTION-B		
4	Vectors: [Scalar and vector quantities, addition and subtraction of vectors, addition of more than two vectors, rectangular components of a vector] (Revision) Position vector, product of two vectors, scalar product, important points about scalar products, some illustrative applications of scalar product, vector product, important points about vector products, some illustrative applications of vector product, Triple product of vectors, scalar triple product, vector triple product, evaluation of vector triple product, scalar and vector fields, partial derivatives – gradient, the operator ∇ , magnitude and direction of $\nabla\phi$, divergence and curl, applications of divergence and curl, some useful results, the Laplacian operator	8
5	Electrostatics: The inverse square law, electrostatic field and intensity, Gauss' theorem in electrostatics, Poisson's and Laplace's equations for an electric field, Meaning of potential, vector form, electric dipole Capacity, energy stored in the field of a charged condenser	8
6	Geometrical Optics: Fermat's principle, derivation of the laws of reflection, derivation of the laws of refraction, Deviation produced by a thin lens, equivalent focal length of two lenses separated by a finite distance, Power of a lens, Cardinal points of an optical system, principal foci & focal planes, principal points & principal planes, Dispersion by a prism, refraction through a prism, angular & chromatic dispersions	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Fundamentals of Physics-Resnick, Halliday & Walker. 8th ed
2. Elements of properties of matter: D S Mathur]
3. A textbook of Optics: Brijlal and Subrahmaniam, 24th ed
4. Vector analysis by Murray Spiegel
5. Fundamentals of magnetism & electricity by D. N. Vasudeva
6. Electromagnetism by Grant & Philips
7. Electricity & magnetism by Rangwala & Mahajan
8. Fundamentals of optics by Jenkins & White

List of Practical/ tutorials: (Practical's – 10)

1. To verify the parallel axes theorem of moment of inertia
2. To verify the perpendicular axes theorem of moment of inertia

3. Modulus of rigidity of a wire using torsional pendulum
4. Modulus of rigidity of a rod by Searle's apparatus
5. Thermal conductivity of a bad conductor by Lee's method
6. Low resistance by Wheatstone's bridge method of projection
7. Study of decay of current in RC circuit
8. Determination of refractive index of liquid using lens system
9. Dispersive power of the material of a prism using spectrometer
10. Resistivity of the material of a conductor using Ohm's law

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Define the motion of objects in different frame of references.	20%
CO-2	Classify laws of motion, reference frames, and its applications i.e. projectile motion, simple harmonic oscillator, Rocket motion, elastic and inelastic collisions.	15%
CO-3	Apply working knowledge of fundamental physics and basic mechanics principles.	15%
CO-4	Analyze the concepts of mechanics and the properties of matter	20%
CO-5	Explain phenomenon based on light and related theories.	10%
CO-6	Organize the event like reflection, refraction, interference, diffraction etc.	20%

List of Open Source Software/learning website:

- <https://ocw.mit.edu/courses/physics/>
- <https://www.einstein-online.info/en/category/elementary/>

Bachelor of Science
Course Code: BC2104
Course Name: Bioscience-I
Semester: I

Type of course: Core Course

Prerequisite: Should have Fundamental knowledge of classification of biodiversity, animal and plant cells structure, basics of Biochemistry.

Rationale: At the end of the course, students will have knowledge about Cell, Cell-organs, Genetics, Microbiology, Microscope and Staining Techniques.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	-	4	6	70	30	70	30	200

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Cell: A unit of life, Cell size and shape, Types of cell, Eukaryotic cell organization, Differences between Prokaryotic and eukaryotic cell.	8
2	Cell-organs: Types, distribution, ultra-structure, composition and functions of cell organelles, Mitochondria, Golgi body, Endoplasmic reticulum, Chloroplast.	8
3	Introduction to Genetics: Mendel's law, Mono hybrid and di-hybrid ratio, Epistasis, Gene concept: Morgan classical concept, Modern concept of gene.	8
SECTION-B		
4	Introduction to microbiology: History and scope of Microbiology, Contribution of scientist in various field of microbiology, Robert Koch, Louis Pasteur, Antony Van Leeuwenhoek, Joseph Lister, Edward Jenner, Alexander Fleming, Microbes and their current position in living world	8
5	Introduction to Microscope: Simple and compound microscope ,working principle and their uses	8
6	Stain and staining techniques: Dyes and stains, Types of stain, Mechanism of staining: Simple staining, negative staining, gram staining	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Microbiology 5th ed. by Pelzar, Chan & Kreig (Tata McGraw-Hill)
2. Genetics by Varma P. & Agrawal V.
3. Cell Biology by Satyesh Chandra and K. Kumar De
4. Microbiology: A Laboratory Manual 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
5. Encyclopedia of Microbiology by Joshua Lederberg , William C. Summers; Martin Alexander, Barry R. Bloom

List of Practical/ tutorials: (Practical's – 10)

1. Introduction to Lab apparatus.
2. Introduction to microscope.
3. Microscopic examination of water infusion.
4. Simple staining (Positive staining)
5. Negative staining.
6. Gram staining.
7. Contribution of scientists: Robert Koch, Louis Pasteur,
8. Contribution of scientists: Antony Van Leeuwenhoek, Joseph Lister,
9. Contribution of scientists: Edward Jenner, Alexander Fleming.
10. Study of permanent slides as per theory

Course Outcomes: After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Define the types and structural details of the basic unit by which all the living things are made of the cell.	20%
CO-2	Associate the student to understand the concept of cell and their activities.	15%
CO-3	Develop the fundamental knowledge of microbiology.	15%
CO-4	Classify the information based on Genetics.	20%
CO-5	Measure the various parameter based on Microscopic Techniques.	10%
CO-6	Explain the various staining agent and use of it.	20%

List of Open Source Software/learning website:

<https://academic.oup.com/bioscience>
<http://www.biosciencenotes.com/>

Bachelor of Science
Course Code: BC2105
Course Name: Mathematics-I
Semester: I

Type of course: Mathematics-I

Prerequisite: Should have Fundamental knowledge of calculus and differential equation

Rationale: At the end of the course, students will have knowledge about problem solving skill, creative talent and translate information into mathematical form using appropriate mathematical formula and techniques.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	2	-	6	70	30	-	-	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	' Moivre's theorem and its applications, Trigonometric functions for multiple arguments.	8
2	Euler's expressions, Evaluation of Indeterminate forms by using Euler's expressions, Hyperbolic, Functions for real arguments and their inverses.	8
3	(A) Exponential, Circular and Hyperbolic functions for complex variables and their identities, Euler's Theorem, Relations between circular and Hyperbolic functions. (B) Logarithm of complex quantities, Separations of Logarithmic, Inverse circular and Inverse hyperbolic, functions into real and imaginary parts	8
SECTION-B		
4	Successive differentiation, Calculation of derivatives of some standard functions (rational functions and powers of sine, cosine functions), Leibnitz theorem and its applications	8
5	Rolle's Theorems and its geometrical interpretation, Lagrange's Theorem and its geometrical interpretation, Cauchy theorem, McLaurin and Taylor series expansions	8
6	(A) Curvature and radius of curvature (except Polar form), Increasing and Decreasing functions, Asymptotes, Concavity and Convexity (B) Reduction formulae for integration of $\sin^n x$, $\cos^n x$, $\tan^n x$, $\csc^n x$, $\sec^n x$, $\cot^n x$, $\sin^p x$, $\cos^q x$, $x^m \sin nx$, $x^m \cos nx$	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. S. L. Loney: Plane Trigonometry, Part I and II, Mc Millan and Co. London.
2. E. Kreyszig: Advanced Engineering Mathematics, Wiley India Pvt. Ltd
3. Shantinakaran: Differential Calculus, Revised Edition December-2004, S. Chand and Co. New Delhi.
4. Shantinakaran: Integral Calculus, S. Chand and Co. New Delhi.
5. M. R. Spiegel: Theory and Problems of Advanced Calculus, Schaum's Publishing Co., New York.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Examine exponential Trigonometry and hyperbolic function and complex number	20%
CO-2	Classify for solution to ordinary differential equation	15%
CO-3	Construct relation between circular function or complex variables and their identities	15%
CO-4	Calculate successive differential equation.	20%
CO-5	Explain the application of Lagrange's Theorem, Cauchy theorem and its application	10%
CO-6	Summarize to use Reduction formulae for integration	20%

List of Open Source Software/learning website:

- <https://www.mathplanet.com/education/algebra-1>
- <https://ocw.mit.edu/courses/mathematics/>

Bachelor of Science
Course Code: BC2106
Course Name: Disaster Management
Semester: - I

Type of course: Generic Elective

Prerequisite: Should have Fundamental knowledge of natural calamities like floods, earthquakes, storms etc.

Rationale: At the end of the course, students will have knowledge about conceptual applications of principles of management to mitigate various disasters

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	-	-	2	70	30	-	-	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Understanding Disasters: Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability and disaster management	2
2	Types, Trends, Causes, Consequences and Control of Disasters: Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters)	6
3	Introduction to Industrial Safety and Hazards: Describe importance of safety in Industry, Classification of hazards: (a) Chemical hazard (b) Thermal hazard (c) Electrical hazard (d) Mechanical hazard (e) Vibrational hazard (f) Biological hazard (g) Radioactive hazard	4
SECTION-B		
4	Disaster Management Cycle and Framework: Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, Prevention and Mitigation of Disasters, Early Warning System; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation	6

	Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment	
5	Disaster Management in India: Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, Role of Government (local, state and national), Non-Government and Inter-Governmental Agencies. Applications of Science and Technology for Disaster Management & Mitigation Geo-informatics in Disaster Management (RS, GIS, GPS and RS)	4
6	Safe Handling of Hazardous Chemicals: Discuss characteristics of and chemical reaction of hazardous chemicals like (a) Chlorine (b) Nitric Acid (c) Ammonia (d) Carbon Monoxide (e) Caustic Soda (f) Phosphoric Acid	2

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
2. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
3. An overview on natural & man-made disasters and their reduction, R K Bhandari, CSIR, New Delhi
4. World Disasters Report, 2009. International Federation of Red Cross and Red Crescent, Switzerland
5. Encyclopedia of disaster management, Vol I, II and III Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006
6. Disasters in India Studies of grim reality, Anu Kapoor & others, 2005, 283 pages, Rawat Publishers, Jaipur
7. Manual of Chemical Technology, Chemtech-I, D.Venkateswarlu, K.R.Upadrashta, K.D. Chandrasekaran
8. Industrial safety management, L M Deshmukh
9. Chemical Process Safety: Fundamentals with application, Daniel A. Crowl, Joshef F. Louvar

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Examine the concepts of disaster	20%
CO-2	Classify the type, trends of disasters and hazards	15%
CO-3	Apply the knowledge of industrial safety at working place	15%
CO-4	Take actions to reduce their vulnerability to disasters.	20%
CO-5	Appraise disaster management in India	10%
CO-6	Explain the characteristic of hazardous chemicals	20%

List of Open Source Software/learning website:

- www.GIS.Development.net
- www.iirs.nrsa.org
- <http://quake.usgs.gov>
- www.nidmindia.nic.in

SRICT Institute of Science & Research

B.Sc. Sem. II

Teaching/Exam Scheme

W.e.f.: 1st April'22

Sr. No.	Course Code	Category of course	Course title	Hours Per week			Tot. con. hrs	Cr edits	E	M	I	V	Total Marks
				L	T	P							
1	BC2108	Foundation Compulsory	English-II	2	-	-	2	2	70	30	-		100
2	BC2109	Core Course	Chemistry-II	4	-	4	8	6	70	30	30	70	200
3	BC2110	Core Course	Physics-II	4	-	4	8	6	70	30	30	70	200
4	BC2111	Core Course	Bio-Science-II	4	0	4	8	6	70	30	30	70	200
5	BC2112	Core Course	Mathematics-II	4	2	0	6		70	30	-	-	100
5	BC2113	Generic Elective	To be selected	2	-	-	2	2	70	30	-		100
6	BC2114	Foundation - Elective	To be selected	-	-	-	-	-	-	-	-		-
			Total	16	0/2	12	28/26	22	350	150	90	210	800/700

Generic Elective	1. Disaster Management 2. Environmental Studies 3. Green Chemistry
Foundation Elective	1. NCC 2. NSS 3. Yoga

* If Students will opt for Bio-Science-I course (BC2111), Total marks will be 800 and if students will opt for Mathematics-I course (BC2112) total marks will be 700

SRICT Institute of Science & Research

Bachelor of Science
Course Code: BC2108
Course Name: English-II
Semester: II

Type of course: Foundation Compulsory

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, students will have knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills. This would be developed through balanced and integrated tasks

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	-	-	2	70	30	-	-	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Vocabulary building: Introduction to Word Formation Types of word formation processes: compounding, clipping, blending, derivation, creative respelling, coining and borrowing ,Acquaintance with prefixes and suffixes Synonyms, antonyms, and standard abbreviations	8
2	Phonetics: IPA, Transcription ,Introduction to different accents	8
3	Identifying Common Errors in Writing: Tenses, Subject-verb agreement Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions Modal Auxiliaries ,Redundancies	8
SECTION-B		
4	Basic Writing Skills: Sentence Structures ,Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence Organizing principles of paragraphs in documents.	6
5	Nature and Style of Writing: Describing, Defining, Classifying, Writing introduction and conclusion	8
6	Writing Practices: Comprehension, Précis Writing, Letter Writing, Email etiquettes, Abstract, Memo writing	10

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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Technical English, Dr. M. Hemamalini, Wiley. 2014
2. Practical English Usage, Michael Swan, OUP. 1995
3. Remedial English Grammar, F.T. Wood, Macmillan. 2007
4. Oxford Language Reference, (Indian Edition) OUP
5. On Writing Well, William Zinsser, Harper Resource Book. 2001
6. Study Writing, Liz Hamp-Lyons and Ben Heasley, Cambridge University Press. 2006
7. A course in English Phonetics-TR Kansakar, Orient Longman, 1998

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Present ideas using various forms of vocabulary in varied situations in oral and written communication.	20%
CO-2	Identify the phonetic symbols and the transcription pattern to learn correct pronunciation.	15%
CO-3	Apply the dynamics of various rules of grammar and check its validation while they speak and write language correctly.	15%
CO-4	Analyze grammar effectively to make themselves competent Listener, Speaker, Reader and Writer by exposing to various set of situations.	20%
CO-5	Relate to various formal and informal documents of day to day life and professional set up.	10%
CO-6	Revise the qualities of writing in diverse situation by using the nuances such as conciseness, clarity, accuracy, organization, and coherence.	20%

List of Open Source Software/learning website:

- <http://www.english-online.org.uk/>
- <http://www.learnenglish.de/>

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Bachelor of Science
Course Code: BC2109
Course Name: Chemistry-II
Semester: II

Type of course: Core Course

Prerequisite: Should have fundamental knowledge of Organic, Inorganic and physical chemistry and its relevance properties

Rationale: At the end of the course, students will have knowledge about Atomic structure, Reaction mechanism of Organic compounds, Thermodynamic, Conductance and Coordination compounds

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	-	4	6	70	30	70	30	200

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Atomic Structure: Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals. Schrodinger wave equation, significance of and 2, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s., p. d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, effective nuclear charge.	8
2	Reaction Mechanism: Hemolytic and Heterolytic fission, reactive intermediates: free radicals, carbonium ions (carbocations), carbanions carbenes, arynes and nitrenes. Types of reagents, electrophiles nucleophiles, Eletromeric, inductive, conjugative effect, Types of reactions: Addition, substitution, elimination, rearrangements. Addition, and substitution with respect to electrophilic and nucleophilic reaction-SN ¹ SN ² , Mechanism of (i) addition reaction to alkenes and dienes (ii) substitution in benzene ring: nitration, sulfonation, alkylation, acylation, halogenation. Cyanohydrin formation and acetal formation, Mechanism of Perkin reaction, Hoffman and Cannizzaro reaction.	8
3	Conductance and Ionic Equilibria: Electrical conductance, specific conductance, equivalent conductance and molar conductance, effect of dilution on concentration, cell constant and its determination, Ostwald's dilution law and its limitations, buffer solutions, acid and basic buffer actions, buffer capacity, relation between pH of acid and basic buffer and concentration of their component, Numericals.	8

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SECTION-B		
4	Coordination Compounds: Definition, Nomenclature of Complex. Werner's theory and its experimental verification. Concept of Effective Atomic Numbers (E.A.N.) for Coordination Compounds. Limitations of Valence bond theory of transition metal complexes. An Elementary idea of (C.F.T.) Crystal field splitting of d-orbital in Octahedral and Tetrahedral. Factors affecting to the crystal field splitting. Application of common complexes & chelates.	6
5	Structure and Bonding: Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, van der Waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance, hyper conjugation, aromaticity, inductive and field effects, hydrogen bonding, Alkenes : Nomenclature, method of preparation, properties and uses of ethylene and propylene Markovnikov rule and Saytzeff rule, polymerization of ethylene styrene and vinyl chloride, Dienes : nomenclature, classification of dienes methods of formation of Butadiene chemical reactions 1,2 and 1,4 additions, Diels – Alder reaction, Alkynes : nomenclature , methods of formation, chemical reactions, electrophilic and nucleophilic addition reactions if acetylene.	10
6	Thermodynamics: Thermodynamics (only introduction) System and surrounding- work & heat, state function, thermodynamic Process, internal energy, enthalpy, free energy, maximum work function. First law of thermodynamics, Heat capacity, specific and molar heat capacity, heat capacity at constant Volume and pressure and their relationship work done in adiabatic and isothermal reversible expansion of an ideal gas. Second law of thermodynamics Carnot cycle and its efficiency Concept of entropy; entropy change for an ideal gas under different Conditions, entropy change for mixture of ideal gases Gibbs-Helmholtz equation Want-Hoff isotherm and isochore, Numericals	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Physical Chemistry by Arun Bahl, B. S. Bahl and G. D. Tuli; Pub. S. Chand
2. Advance physical chemistry by D. N. Bajpai; Pub : S. Chand
3. Vogel's qualitative Inorganic analysis
4. Inorganic chemistry by Wahid Malik, G. D. Tuli, R. D. Madan; Pub. S. Chand
5. Basic Inorganic Chemistry by Cotton & Wilkinson.
6. Advance physical chemistry by D. N. Bajpai, Pub : S. Chand
7. Physical Chemistry by G. M. Barrow

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List of Practical/ tutorials: (Practical's – 10)

A. Inorganic Qualitative Analysis

B. Standardization of following solution;

- 1.0.1 N succinic acid
- 2.0.1 N KHP
- 3.0.01 N $\text{Na}_2\text{S}_2\text{O}_3$
- 4.0.1 N $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$
- 5.0.1 N $\text{K}_2\text{Cr}_2\text{O}_7$

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Describe the various theories proposed on atomic structure of elements.	20%
CO-2	Discuss the Mechanism of various reaction and their application.	15%
CO-3	Construct the physical properties based on electrochemistry	15%
CO-4	Categories the properties of metal complexes	20%
CO-5	Ascertain the bonding properties of various molecule.	10%
CO-6	Explain the law of thermodynamics.	20%

List of Open Source Software/learning website:

- <https://www.library.qmul.ac.uk/subject-guides/chemistry/useful-websites/>
- https://blog.feedspot.com/chemistry_websites/
- <https://www.rsc.org/periodic-table>

SRICT Institute of Science & Research

Bachelor of Science
Course Code: BC2110
Course Name: Physics-II
Semester: II

Type of course: Core Course

Prerequisite: Should have fundamental knowledge of basic physics, their theory and application.

Rationale: At the end of the course, students will have knowledge about Properties of Matter, Oscillation, Modern Physics, Optics, Electronics, and Magnetism

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	-	4	6	70	30	70	30	200

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Oscillation and Waves: Wave motion, what propagates in wave motion, Characteristics of wave motion, transverse wave motion, longitudinal wave motion, definitions, relations between frequency and wavelength, equation of simple harmonic waves, Differential equation of wave motion, particle velocity wave velocity, energy of progressive waves, Laws of transverse vibrations in a string, verification of the laws of transverse vibrations of the string, Melde's experiment	8
2	Properties of Matter: Bending of beams, the cantilever, depression of a beam supported at the ends , determination of Y by bending of a beam, Konig's double mirror for determining Y for the material of a beam, determination of elastic constants by Searle's method	8
3	Modern Physics: Introduction, properties of X-rays, applications of x-rays, production of x-rays, intensity of X-rays: measurement, variation of X-ray intensity with wavelength, origin of continuous X-radiations, origin of characteristic X-ray lines, Mosley's work on X-ray spectra, absorption of X-rays, diffraction of X-rays: Laue photographs , Bragg's X-ray spectrometer. Introduction, constituents of nuclei, isotopes, Isobars, Isotones and mirror nuclei, Nuclear mass and binding energy, unit of atomic mass, binding energy and stability of nucleus, Nuclear size, nuclear forces.	8
SECTION- B		
4	Magnetism: Law of force between two magnetic poles, magnetic field-lines and tubes of forces, behavior of a magnetic substance in a magnetic field permeability induction, magnetic flux and flux density, magnet in a	8

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	magnetic field, intensity or surface density o magnetization of a magnet , intensity of magnetic field at a point due to a bar magnet	
5	Optics: Introduction, coherent sources, phase difference & path difference, theory of interference fringes, Fresnel's bipris, interference in thin films , interference due to reflected light (thin film), fringes produced by a wedge-shaped thin film, Newton's rings (for reflected light only), determination of the wavelength light using Newton's rings, refractive index of a liquid using Newton's rings	8
6	Electronics: Introduction, unregulated power supply, regulated power supply, rectifiers, Full-wave rectifier , filters, series inductor filter, shunt capacitor, LC filter, the CLC or Pi filter, Zener diode, voltage regulation, Binary to decimal conversion, decimal to binary conversion , octal numbers , hexadecimal numbers.	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Waves and oscillations: Brijlal and Subrahmanyam
2. Elements of Properties of Matter: D S Mathur, 11th ed
3. Atomic and Nuclear physics: Gupta and Ghosh, 2nd ed
4. Fundamentals of Physics: Resnick, Halliday & Walker, 8th ed
5. Fundamentals of magnetism & electricity by D. N. Vasudeva
6. Electromagnetism by Grant & Philips
7. Electricity & magnetism by Rangwala & Mahajan
8. Fundamentals of optics by Jenkins & White
9. Microelectronics by Millman & Grabel
10. Electronics: Fundamentals & applications by Allen Mottershead

List of Practical/ tutorials: (Practical's – 10)

1. Force constant (k) of a spring
2. Speed of transverse waves on a stretched wire of various linear densities using sonometer.
3. Elastic constants and by Searele's method
4. Melde's experiment by cantilever
5. Study of magnetic field due to Solenoid
6. Impedance of an LCR ac series network
7. Wattage of a lamp
8. Newton's ring experiment
9. Study of rectifiers
10. Zener diode as a voltage regulator

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Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Arrange proficiency in mathematics and the mathematical concepts Needed for a proper understanding of physics.	20%
CO-2	Define the knowledge of classical mechanics, electromagnetism.	15%
CO-3	Apply the theory and application based on oscillation.	15%
CO-4	Classify the properties related to the optics and theories around it.	20%
CO-5	Explain the fundamental theories of Modern Physics and their utilization in day to day function.	10%
CO-6	Evaluate various form of matters, their properties and application.	20%

List of Open Source Software/learning website:

- <https://ocw.mit.edu/courses/physics/>
- <https://www.einstein-online.info/en/category/elementary/>

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Bachelor of Science
Course Code: BC2111
Course Name: Bioscience-II
Semester: II

Type of course: Core Course

Prerequisite: Should have fundamental knowledge of

Rationale: At the end of the course, students will have knowledge about Morphology, Cell-biology and Bio-analytical Techniques

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	-	4	6	70	30	70	30	200

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Structure and Functions of Cell organelles: Cell membrane, Ribosome, Nucleolus Lysosome	8
2	Chromosome and Cell cycle: Chromosome: Morphology & types, Cell cycle: Mitosis and meiosis, Chromosomal aberrations: Deletion, Inversion, Duplication and Translocation, Non disjunction and aneuploidy.	8
3	Multiple Alleles: Blood group inheritance, Sex linked inheritance: Hemophilia, color blindness.	8
SECTION-B		
4	Introduction to prokaryotes: Ultra structure of prokaryotic cell, Characteristics of prokaryotic cell, Types of bacteria, morphology of bacteria (size & shape)	8
5	Introduction to Protists, Yeast and mold(Fungi): General characteristics & outline classification of protozoan, algae, General characteristics & outline classification of Yeast and mold(Fungi)	8
6	Introduction to sterilization, preservation, pasteurization and sanitization. Antiseptic and disinfectant.	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

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Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Encyclopedia of Microbiology by Joshua Lederberg, William C. Summers; Martin Alexander, Barry R. Bloom
2. Introduction To fungi by John Webster, Roland Weber
3. Genetics: A Molecular Approach 2nd ed. by Russell, P. J. (2005). Benjamin Cummings.
4. Atlas of Cell Organelles Fluorescence. Elli Kohen, Rene Santus, Joseph G. Hirschberg, Nuri Ozkutuk.
5. Principles of Genetics – D. Peter Snustad, Michael J. Simmons
6. Cell and Molecular Biology: Concepts and Experiments – Gerald Karp

List of Practical/ tutorials: (Practical's – 10)

1. Study of nucleus by staining of onion peel.
2. Study of nucleolus by staining of onion peel.
3. Study of mitotic cell division in onion root tip.
4. Microscopic study of various size of bacteria.
5. Microscopic study of various shape of bacteria
6. Study of different types of blue green algae.
7. Introduction to antiseptic, disinfectant, preservative and sanitizing agent.
8. Study of various types of fungi (by chart, image)
9. Study of microscopic protozoa.
10. Study of permanent slides as per theory.

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Define the available representative forms of Yeast and Fungi	20%
CO-2	Describe the basic introduction to cell biology	15%
CO-3	Examine the physiological process and morphology	15%
CO-4	Categories the fundamental aspects of cell structure and function	20%
CO-5	Explain the fundamental of analytical techniques in biological science	10%
CO-6	Construct the fundamental genetic and evolution	20%

List of Open Source Software/learning website:

- <https://academic.oup.com/bioscience>
- <http://www.biosciencenotes.com/>

SRICT Institute of Science & Research

Bachelor of Science
Course Code: BC2112
Course Name: Mathematics-II
Semester: II

Type of course: Core Course

Prerequisite: Should have Fundamental knowledge of Matrices, matrix and differential equation

Rationale: At the end of the course, students will have knowledge about Properties of operations of matrices, Curve Tracing, Application of Integral calculus and Bernoulli's equation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	2	-	6	70	30	-	-	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Matrices: Different types of matrices, Operations on matrices, Properties of operations of matrices, Elementary, row operations,	8
2	Row-reduced echelon forms, Inverse of matrix by Row –Reduced Echelon form. Row rank of a matrix, Quadratic forms.	8
3	Trace of matrix and its properties, Solution of homogeneous system of linear equations using row reduced echelon forms., Characteristic equation of a matrix, Method to find Characteristic equation using determinant and minors of a matrix, Eigen values and Eigen vectors of a matrix, Cayley-Hamilton theorem and its application to find an inverse of a matrix, Method of diagonalization.	8
SECTION-B		
4	Curve Tracing : Equation of the form $y = f(x)$, Equation of the form $y^2 = f(x)$, Parametric equations,	8
5	Application of Integral calculus: Length of a curve, Intrinsic equation (except polar coordinates).	8
6	Bernoulli's equation, Exact differential equation, Differential equations of first order and higher degree: Lagrange's equation, Clairaut's equation, Linear Differential Equations with constant coefficients: Complimentary functions, Particular Integral, General Solution, Method for finding Particular Integral specially for e^{ax} , $\sin ax$, $\cos ax$ polynomial in term of $e^{ax}V$ and xV , where V is a function.	8

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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Krishnamurthy, Marina and Arora: An Introduction to linear Algebra, Affiliated West Press Pvt. Ltd., New Delhi.
2. Erwin Kreyszig: Advanced Engineering Mathematics, Wiley India (P) Ltd., 2009.
3. B.S.Vasta and Suchi Vasta: Theory of Matrices; 4rd Edition -2014, New Age International (P) Ltd. Publishers, New Delhi.
4. Shanti Narayan: Text book of Matrices, S. Chand and Co., New Delhi.
5. H. K. Dass, H. C. Saxena, and M. D. Raisinghanian: Simplified course in Matrices, S. Chand and Co., New Delhi.
6. Shanti Narayan: Differential calculus, 4th edition -2001, Shyamlal Charitable Trust, Ramnagar, New Delhi, S. Chand and Company LTD.
7. D.A.Murray: Differential Equations, Tata Mc Graw Hills.

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Recognize abstract thinking and visualization of students	20%
CO-2	Construct problem solving ability by solving example and counter example of various concepts involved	15%
CO-3	Apply basic Matrix, Algebra and to find solution to system of linear equation	15%
CO-4	Deduce curve by using parametric equation	20%
CO-5	Evaluate mathematical concept to practical and real life problems	10%
CO-6	Develop matrix computation in comprehensive manner	20%

List of Open Source Software/learning website:

- <https://www.mathplanet.com/education/algebra-1>
- <https://ocw.mit.edu/courses/mathematics/>

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Bachelor of Science
Course Code: BC2113
Course Name: Environmental Studies
Semester: II

Type of course: Generic Elective

Prerequisite: Should have Fundamental knowledge of basic science such as biology, geology, geography, chemistry etc.

Rationale: At the end of the course, students will have knowledge about Biodiversity, Ecosystem, Environmental pollution and relation between Human and Environment

Teaching and Examination Scheme:

Teaching and Examination Scheme:								
Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	-	-	2	70	30	-	-	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to Environmental studies: Definition, scope and importance, Natural resources: Renewable and Non-renewable resources. Role of an individual in the conservation of natural resources, Concept of sustainability and sustainable development	3
2	Biodiversity and its conservation: Introduction- definition, Types of diversity, Value of biodiversity, Threats to biodiversity, Biodiversity Index, Conservation of biodiversity: In- situ and Ex-situ conservation of biodiversity.	3
3	Ecosystems: Concept of ecosystem, Structure and function of ecosystem, Producers, consumers and decomposers. Energy flow in an ecosystem: food chain, food web and ecological succession Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).	6
SECTION-B		
4	Environmental Pollution: Definition, causes, effects and control measures. Of Air pollution, Water pollution, Soil pollution and Noise pollution, Global warming: Depletion of ozone layer, greenhouse effect. Solid waste management: Causes, effects and control measures of urban and industrial wastes	6
5	Human Population and the Environment: Population explosion: Family welfare program, methods of sterilization, urbanization, environment and human health, infectious diseases, water-related	3

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	diseases, risks due to chemicals in food, cancer. HIV/AIDS, Woman and child welfare.	
6	Society, Government and Environment: Environment protection Act. Air (Prevention and control of pollution) Act. Water (Prevention and control of pollution) Act. Wild life protection Act. Forest conservation and Biodiversity protection Act in brief. Public awareness and human rights. Case studies on environmental molestation and peoples triumph (silent valley, chipko andolan) Global Earth summits.	3

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Agarwal, K.C.(2001) Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach (2003), The Biodiversity of India of India, Mapin Publishing Pvt. Ltd., Ahmedabad- 380013, India, Email: mapin@ivenet.net (R)
3. Gadgil, Madhav (2001) Ecological Journeys, The Science and Politics of conservation in India. Permanent Black.
4. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.(2001). Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
5. Dcc A.K., Environmental Chemistry, Wiley Eastern Ltd.
6. Down to Earth, Centre for Science and Environment (R)

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Examine an integrative approach to environmental issues with a focus on sustainability	20%
CO-2	Identify the global scale of environmental problems	15%
CO-3	Illustrate the Biodiversity, threats to Biodiversity and its value	15%
CO-4	Analyze the environmental pollution and their effect on environment	20%
CO-5	Understand the relationship between humans and their environment	10%
CO-6	Recognize the physical, chemical, and biological components of the earth's systems and show how they function	20%

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List of Open Source Software/learning website:

- <https://www.edx.org/learn/environmental-science>
- <https://academicearth.org/environmental-studies/>