



(Bachelor of Science)(Undergraduate)  
B. Sc. (UG) Semester -III

Course Code	<b>US03SCHE51</b>	Title of the Course	<b>POLYMER SCIENCE – I</b>
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	To make students familiar with: 1. Polymer science as a subject 2. Application of polymer science in development of chemical science as subject. 3. Basic concepts related to polymers, polymerization techniques, Methods of molecular weight determination etc.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction, classification of polymers, Nomenclature of polymers, Chain growth polymerization, Mechanism of free-radical, Cationic and Anionic polymerization, polycondensation polymerization.	<b>25%</b>
2.	Polymerization Techniques, Concept of Averages-Number average molecular weight, Weight average molecular weight, Viscosity average molecular weight, Molecular weight and Degree of polymerization, Poly-dispersity and molecular weight distribution.	<b>25%</b>
3.	Methods for determination of molecular weight, Membrane Osmometry, Vapour Phase Osmometry, Viscometry, Light Scattering.	<b>25%</b>
4.	Glass Transition Temperature (T <sub>g</sub> ), factors affecting glass transition temperature, glass transition temperature and molecular weight, T <sub>g</sub> and melting point, crystallinity in polymers.	<b>25%</b>

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage





1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	---
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to

1. From the study of this paper, student will learnt about basic concept of Introduction of polymer, classification of polymers, Polymerization Techniques, Nomenclature of polymers, Concept of Averages-Number average molecular weight, Weight average molecular weight Methods for determination of molecular weight, Glass Transition Temperature (T<sub>g</sub>). This study will helpful them in further studies and in industries.
2. Apply this knowledge in further studies of third year B.Sc. chemistry course.

Suggested References:

Sr. No.	References
1.	Principles of polymers Science by P. Bahadur and N. V. Sastry. (Second Edition)
2.	Polymer Science by V. R. Gowariker, N. V. Vashwanathan and Jaydev Shreedhar.

On-line resources to be used if available as reference material

On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science)(Undergraduate)  
B. Sc. (UG) Semester -III

Course Code	<b>US03SCHE52</b>	Title of the Course	<b>QUANTITATIVE METHODS OF ANALYSIS</b>
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	To make students familiar with: 1. Various analytical methods 2. Application of analytical chemistry in development of chemical science as subject. 3. Basic concepts related to titrimetric methods, neutralization titration, complexometric titration and redox titration.		

Course Content		
Unit	Description	Weightage* (%)
1.	Titrimetric Methods in Analysis Introduction, Definitions: Standard solutions, Equivalence Point, End point, Primary standards, Desirable properties of standard solution, Volumetric calculations: Molarity, Normality, percentage concentration, parts per million.	25%
2.	Neutralization Titration: Standard solution and acid-base indicators. Titration curve for strong acid-strong base, Systematic equilibrium concentrations for SA-SB titration. Acid-Base indicators, colour change range of an indicator, Indicator error, Determination of Acetic acid in vinegar, Determination of Alkalinity of soda ash.	25%
3.	Complexometric Titration : Introduction, terms involved in titration: complex, ligand, EDTA,buffer solution, Complexometric titration curve. Equilibria involved in EDTA titration, types of EDTA titrations, Indicators for EDTA titrations, Hardness of water.	25%
4.	Redox Titration :Introduction, Terms involved: oxidation, reduction. Single electrode potential, formal potential, Nernst Equation, Titration curve for Iron(II) and cerium (IV). Types of redox indicators and their selection, Structural chemistry of redox indicators.	25%

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	---
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	From the study of this paper, student will learnt about basic concept of Titrimetric Methods in Analysis, Neutralization Titration, Complexometric Titration, Redox Titration. This study will helpful them in further studies and in industries.
2.	Apply this knowledge in further studies of third year B.Sc. chemistry course.
Suggested References:	
Sr. No.	References
1.	Fundamentals of Analytical Chemistry, 7th Edition by skoog, west, Holler.
2.	Quantitative Analysis 6th Edition. R.A. Day, Jr., A.L. Underwood.
3.	Analytical Chemistry –Dr. Alka Gupta, Pragati Prakashan
4.	Analytical Chemistry : Principles, 2Ed –John H. Kennedy.
5.	Analytical Chemistry –VIth Ed. Gary D. Christian.

On-line resources to be used if available as reference material
On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science)(Undergraduate)  
B. Sc. (UG) Semester -III

Course Code	<b>US03SCHE53</b>	Title of the Course	<b>PHARMACEUTICAL CHEMISTRY: FUNDAMENTALS</b>
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	To make students familiar with: 1. Various concept of Pharmaceutical Chemistry. 2. Application of pharmaceutical chemistry in development of chemical science as subject. 3. Basic concepts related to Pharmaceutical Chemistry, Basics of drugs and formulation analysis, Introduction and Classification of drugs, and some inorganic compounds having pharmaceutical importance.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to Pharmaceutical Chemistry, pharmacopeia, pharmaceuticals, pharmacognosy. Impurities in Pharmaceuticals: Sources of impurities, tests for purity and identity, limit tests for iron, arsenic, lead, heavy metals, chloride, sulphate.	25%
2.	Basics of drugs and formulation analysis : Weights, balances, importance of analysis, quality control and quality assurance, analytical methods (classification, validation parameters), requirements –chemicals (types, purification, checking purity), glass wares (types, calibration, cleaning), sampling techniques, sampling error minimization. Units of concentrations. Errors science, errors minimization.	25%
3.	Introduction and Classification of drugs. Quality control of Drugs and Pharmaceutical Importance of quality control, significant errors, methods used for quality control.	25%
4.	General discussion on the following inorganic compounds including important physical and chemical properties, medicinal and Pharmaceutical uses, storage conditions and chemical incompatibility. A. Acids, bases and buffers Boric acid, Hydrochloric acid, strong ammonium hydroxide, Calcium hydroxide, Sodium hydroxide and official buffers. B. Antioxidants-Hypophosphorous acid, Sulphur dioxide, Sodium bisulphite, Sodium metabisulphite, Sodium thiosulphate, Nitrogen and Sodium Nitrite. C. Gastrointestinal agents : i) Acidifying agents Dilute hydrochloric acid. ii) Antacids-Sodium bicarbonate, Aluminium hydroxide gel, Aluminium Phosphate, Calcium carbonate,	25%





	Magnesium carbonate, Magnesium trisilicate, Magnesium oxide, Combinations of antacid preparations.	
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Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	--
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	From the study of this paper, student will learnt about basic concept of Introduction to Pharmaceutical Chemistry, pharmacopeia, Basics of drugs and formulation analysis, Introduction and Classification of drugs, General discussion on the inorganic compounds including important physical and chemical properties, medicinal and Pharmaceutical uses, storage conditions and chemical incompatibility. This study will helpful them in further studies and in industries.
2.	Apply this knowledge in further studies of third year B.Sc. chemistry course.
Suggested References:	
Sr. No.	References
1.	Pharmaceutical chemistry-I by Anil Bhanderi and G K Singh, CBS Publishers. 2018.
2.	Inorganic Medicinal and Pharmaceutical Chemistry : J. H. Block, E. B. Roche, T. O. Soine, C. O. Wilson, Varghese Publishing House, First Indian Reprint, 1986.
On-line resources to be used if available as reference material	
On-line Resources: Google books, INFLIBNET, Google Web	

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**(Bachelor of Science in Statistics) (Bachelor of Science)**  
**(B. Sc.) (Statistics) Semester (III)**

Course Code	US03SSTA51	Title of the Course	FOUNDATION OF STATISTICS - I
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	The main objective of this course is to acquaint students with some basic concepts in Statistics. They will be introduced to some elementary statistical methods of analysis of data. At the end of this course students are expected to be able to analyse the data.
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Course Content		
Unit	Description	Weightage* (%)
1.	Collection of data – I: Introduction, meaning, applications and limitations of Statistics, Methods of collecting data : Survey Method and Experimental method, Concept of a statistical population and sample from a population, Advantages of sample survey, Methods of sampling: Simple random sampling, Stratified random sampling, Systematic sampling	25
2.	Collection of data – II: Primary data, Methods of collecting primary data: Direct personal inquiry method, Mailed Questionnaire method, Indirect oral investigation method, Secondary data, Chief sources of secondary data, Difference between Primary and Secondary data, Types of characteristics (data), Attributes: Nominal and Ordinal, Variables: Discrete and Continuous	25
3.	Presentation of data: Classification: Definition, Purpose, Rules and Types of classification, Tabulation: Meaning & importance, Parts of a table, Requisites of good table, Types of table, Simple or one way table, Two way table, Manifold table (Up to four) (with examples), Diagrammatic and Graphical presentation of data: Importance and its uses, Types of diagrams, Bar diagram: Simple, Sub-divided, Percentage, Multiple, Pie chart, Graphical presentation of data: Histogram (with uniform class-width), Frequency polygon, Frequency	25





	curves, Ogives, Determination of median and mode from graphs	
4.	Analysis of Quantitative data: Measures of central tendency (Mean, Median, Mode), Measures of dispersion: Range, Quartile Deviation, Standard Deviation and Coeff. of Variation, Skewness (Bowley's and Karl-Pearson's coeff. of skewness)	25

Teaching-Learning Methodology	
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	tabulate statistical information given in descriptive form
2.	use graphical techniques and interpret
3.	compute various measures of central tendency, dispersion, skewness
4.	apply statistics in the various fields.

Suggested References:
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Sr. No.	References
1.	Gupta S.C. and Kapoor V.K. : Fundamentals of applied statistics
2.	Gupta S.C. : Fundamentals of statistics
3	Ken Black, Business Statistics (4 <sup>th</sup> edition ) Willey student edition

On-line resources to be used if available as reference material

On-line Resources

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**(Bachelor of Science in Statistics) (Bachelor of Science)**  
**(B. Sc.) (Statistics) Semester (III)**

Course Code	US04SSTA52	Title of the Course	OPERATIONS RESEARCH - I
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	<ol style="list-style-type: none"><li>1. To impart knowledge in concepts and tools of Operations Research</li><li>2. To formulate verbal problem into mathematical form</li><li>3. To understand mathematical tools that are needed to solve optimization problems used in Operations Research</li><li>4. To apply techniques constructively to make effective business decisions.</li></ol>
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Course Content		
Unit	Description	Weightage* (%)
1.	Linear Programming – I: Introduction, Formulation of LPP, Solution of LPP using Graphical method	25
2.	Linear Programming – II: Solution of LPP using Simplex method (Big M method), Duality	25
3.	Transportation Problems – I: Introduction, Mathematical formulation of Transportation problem, Methods of finding i.b.f. solution: North West Corner Method (N-W Corner Method), Row Minima Method, Column Minima method, Matrix Minima Method (Least Cost Entry Method), Vogel's Approximation method (VAM)	25
4.	Transportation Problems – II: uv method of obtaining optimum solution of TP, Unbalanced TP, Degenerate TP	25

Teaching-Learning	
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Methodology	
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	solve Linear Programming problems using various methods
2.	solve Transportation Problems and its applications in day to day life.

Suggested References:	
Sr. No.	References
1	KantiSwarup Gupta, P.K. and Manmohan : Operations Research, Sultan Chand and Sons
2.	Sharma J.K. : Operations Research
3	Taha Hamdy A. : Operations Research
On-line resources to be used if available as reference material	
On-line Resources	

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**(Bachelor of Science in Statistics) (Bachelor of Science)**  
**(B. Sc.) (Statistics) Semester (III)**

Course Code	US03SSTA53	Title of the Course	BIOSTATISTICS - I
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	<ol style="list-style-type: none"> <li>1. Understand and apply statistical methods for the design of experiments.</li> <li>2. To recognize the importance of data collection and presentation.</li> <li>3. Apply descriptive measures used to summarize data.</li> <li>4. Understand the basic concepts of probability theory to learn concepts of testing of hypothesis.</li> </ol>
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Course Content		
Unit	Description	Weightage* (%)
1.	Collection and Presentation of data: Variables used in biology  Collection and tabulation of quantitative and qualitative data, Diagrammatic representation of data: Bar Diagram : Simple, Sub-divided (Component), Percentage, Multiple, Pie Chart  Graphical representation of data: Histogram, frequency polygon, frequency curves, Ogives, Determination of median and mode from graph	25
2.	Analysis of Quantitative data – I: Measures of central tendency, Mean, Median, Mode, Partition values, Applications in the field of Biosciences	25
3.	Analysis of Quantitative data – II: Measure of dispersion, Range, Quartile deviation (Q.D), Standard deviation (S.D), Coefficient of Variation (C.V), Skewness, Karl-Pearson's coefficient of skewness, Bowley's coefficient of skewness	25
4.	Introduction to probability: Basic concepts of probability, Various definitions of probabilities, Laws of probabilities and Examples, Discrete Probability Distributions: Binomial, Poisson and Examples	25





Teaching-Learning Methodology	
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Define the principal concepts about biostatistics
2.	Collect data relating to variable/variables which will be examined and calculate descriptive statistics from these data.
3.	Present the data through various graphs and diagrams
4.	Apply the concepts of probability and discrete probability distributions applied in the field of bioscience.

Suggested References:	
Sr. No.	References
1.	Gupta S.C : Mathematical Statistics
2.	Mahajan B.K. : Methods in Biostatistics





3	Sancheti D.C. and Kapoor V.K. : Statistics
4	Wayne W. Daniel : Biostatistics - A foundation for analysis in the health sciences

On-line resources to be used if available as reference material
On-line Resources

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**B. Sc. (Industrial Chemistry Vocational) Semester –III**

Course Code	<b>US03SICV51</b>	Title of the Course	<b>Industrial Pollution, its Control and Safety</b>
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	To make students familiar with: 1. Basic of Pollution and its effect. 2. Concepts of waste management. 3. Introduction to hazards and safety.
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Course Content		
Unit	Description	Weightage* (%)
1.	Atmosphere, Eco-System and Air Pollution, Sources and Effect of Air Pollutant, Green House Effect, Air Pollution control Technique.	<b>25%</b>
2.	Water Pollution and its source, Types of water pollutants and their adverse effects, Waste water treatment, BOD and COD tests, Pesticide Pollution and sound pollution.	<b>25%</b>
3.	Solid Waste Management, Collection and Disposal of solid waste, Radio activity and Radiation Pollution, Pollution Statutory limits. Biomedical waste and e-waste-generation and its management.	<b>25%</b>
4.	Industrial hazards, Safety consideration in chemical industries, Chemical, Electrical and mechanical hazards, Fire and explosion hazard, Health hazard, Laboratory Safety, Safety Practice, Factory acts.	<b>25%</b>

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Industrial Chemistry Vocational programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage





1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	--
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	--
3.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to ---

1.	Learn about basic of pollution and its effect, waste management, hazards and safety.
2.	Apply knowledge in further studies of third year B.Sc. Industrial Chemistry Vocational course.

Suggested References:

Sr. No.	References Books
1.	Environmental Chemistry, B. K. Sharma (Krishna Prakashan Media (P) Ltd., Meerut).
2.	Environmental Pollution Control Engineering, C. S. Rao (Wiley Eastern Ltd., New Delhi)
3	Engineering Chemistry, Jain and Jain (Dhanpat Rai and Sons)
4	Introduction to Environmental Engineering and Science, G. M. Masters.
5	Environmental pollution, H. N. DIX (J.W & Sons).
6	Chemical technology, Vol I, D. Venkateshwaraly (C. Chand & co)
7	Hand book of human factor and ergonomics by Salvendy, Jhon Wiley and sons.
8	Occupational safety and health by David L Goetsch.
9	Electronic waste management by Ronald E. Hester and Roy M Harrison.

On-line resources to be used if available as reference material

On-line Resources: Google books, INFLIBNET, Google Web

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(Bachelor of Science) (Mathematics)  
 (B.Sc.) (Mathematics) Semester (III)

Course Code	US03SMTH51	Title of the Course	NUMBER THEORY - 1
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	1. To teach students Introductory Number Theory. 2. To teach students types of fundamental operations and functions in Number Theory. 3. To teach students various properties of Prime Numbers.
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Course Content		
Unit	Description	Weightage* (%)
1.	Divisibility, Fundamental theorem of divisibility, Square number, Common divisors, Greatest common divisor (G.C.D.): definition and examples, Properties of G.C.D.	25%
2.	Least common multiple (L.C.M.): definition and examples, Properties of L.C.M, Relation between GCD and LCM, Prime numbers, Fundamental property of prime number, Factorization in prime numbers , Unique factorization theorem.	25%
3.	Total number of positive divisor of positive integer , Sum and product of positive divisors of positive integer, Definition of Congruences ,Definition of Euler's function, Perfect numbers : definition and examples , Mersenne numbers: definition and examples , Fermat numbers : definition and examples.	25%
4.	Gauss function : definition and examples ,Properties of Gauss function, Mobius function : definition and examples , Properties of Mobius function ,Fibonacci numbers : definition and examples ,Properties of Fibonacci numbers.	25%

Teaching-Learning Methodology	Classroom teaching, Presentation by students, Use of ICT whenever required.
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Evaluation Pattern		
Sr.	Details of the Evaluation	Weightage





No.		
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	---
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100% (50 Marks)

Course Outcomes: Having completed this course, the learner will be able to

1.	understand basic concepts of Number Theory.
2.	use various operations and functions in Number Theory to solve problems.
3.	take up an Elementary to Intermediate course in Number Theory

Suggested References:

Sr. No.	References
1.	D.Burton , elementary Number Theory, 6th Ed , Tata McGraw-Hill Edition,Indian reprint.
2.	I.Niven And H.Zuckermar , An Introduction to the theory of Numbers, Wiley-Eastern Publication.
3.	S.Barnard and J.N.Child , Higher Algebra, Mc Millan and Co. Ltd.
4.	Neville Robinns, Beginning Number Theory, 2nd Ed.,Narosa Publishing House Pvt.Ltd. Delhi,2007

On-line resources to be used if available as reference material

On-line Resources

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(Bachelor of Science) (Mathematics)  
 (B.Sc.) (Mathematics) Semester (III)

Course Code	US03SMTH52	Title of the Course	GRAPH THEORY - 1
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	1. To teach students Introductory Graph Theory. 2. To teach students various types of operations on graphs. 3. To teach students fundamental properties of various types of graphs.
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Course Content		
Unit	Description	Weightage* (%)
1.	Graph, Applications of graph, Finite and infinite graph, Incidence and Degree, Isolated vertex, Pendant vertex and null graph, Isomorphism, Sub graphs, Walks, Paths and circuits.	25%
2.	Connected and disconnected Graphs, Components, Euler graphs, Operation on graph, More on Euler graphs, Arbitrary Traceable graph Hamiltonian paths and circuits.	25%
3.	Trees and their properties, Pendant vertices in a tree, Distance and centers in a tree, Counting trees , Spanning Trees, Fundamental circuits, Finding all spanning trees of a graph.	25%
4.	Cut-sets in a graph and their properties, Fundamental circuits and cut sets, Con- nectivity and separab.	25%

Teaching-Learning Methodology	Classroom teaching, Presentation by students, Use of ICT whenever required.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	---
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100%





		(50 Marks)
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Course Outcomes: Having completed this course, the learner will be able to

1.	understand basic concepts of Graph Theory.
2.	identify types of graphs and use various operations on graphs to solve problems.
3.	take up an Elementary to Intermediate course in Graph Theory

Suggested References:

Sr. No.	References
1.	Narsingh Deo, Graph theory with application to engineering and Computer science, Fourth printing, prentice Hall of India, 1987. Chapter 1 (except 1.6), Chapter 2 (except 2.3,2.10), Chapter 3 (except 3.5,3.10), Chapter 4 (except4.6,4.7,4.8)
2.	J.Clark and A.D.Holton, A first look at Graph Theory, First Indian Reprint. Allied Publishers,1995.
3.	D.B.West, Introduction to graph theory, Prentice Hall of India, New Delhi, 1999.

On-line resources to be used if available as reference material

On-line Resources

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(Bachelor of Science) (Mathematics)  
(B.Sc.) (Mathematics) Semester (III)

Course Code	US03SMTH53	Title of the Course	MECHANICS - 1
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	<ol style="list-style-type: none"><li>1. To introduce students to mechanics.</li><li>2. To teach students fundamental laws and results in mechanics.</li><li>3. To teach students how to study how to apply laws and results of mechanics in specific situations in science and real life.</li></ol>
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Course Content		
Unit	Description	Weightage* (%)
1.	Ingredients of mechanics, Position vector, Velocity vector, Acceleration vector, Gradient vector, Fundamental laws of Newtonian mechanics, Theory of dimensions.	25%
2.	Plane statics, Equilibrium of a particle, Equilibrium of systems of particles, Moment of force about a line, Necessary and sufficient condition for equilibrium.	25%
3.	Couples, Work and potential energy, Principle of virtual work, Application in plane statics, Mass center and center of gravity, Gravitational potential.	25%
4.	Flexible cables, Cable in contact with smooth and rough curve, Plane Kinematics, Kinematics of a particle, Motion of a rigid body parallel to a plane.	25%
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Teaching-Learning Methodology	Classroom teaching, Presentation by students, Use of ICT whenever required.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	---





2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100% (50 Marks)

Course Outcomes: Having completed this course, the learner will be able to

1.	understand basic concepts of Mechanics.
2.	apply results of mechanics in specific situations.
3.	. take up an Elementary to Intermediate course in Mechanics.

Suggested References:

Sr. No.	References
1.	J.L.Synge and B.A.Griffith , Principles of Mechanics . Chapter 1, Chapter 2(2.2,2.3,2.4), Chapter 3(3.1 , 3.4), Chapter 4(4.1,4.2)
2.	P.N.Chaterjee, Statics and Dynamics

On-line resources to be used if available as reference material

On-line Resources

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Bachelor of Science  
B.Sc. NCC Semester III

Course Code	US03SNCC51	Title of the Course	NCC Army-3
Total Credits of the Course	2	Hours per Week	3

Course Objectives: ( Theory )	<p>Cadets will be able to: -</p> <ul style="list-style-type: none"><li>(a) Understand the life history and leadership qualities of great leaders, sportspersons &amp; entrepreneurs.</li><li>(b) Understand the various aspects of types of mindset.</li><li>(c) Understand public speaking methods &amp; qualities.</li><li>(d) Understand the organizations related to disaster management and their functioning.</li><li>(e) Understand the role of NCC cadets in disaster management.</li><li>(f) Understand the various types of adventure activities.</li><li>(g) Understand the History, Geography &amp; Topography of Border/ Coastal Areas.</li></ul>
Course Objectives: ( Practical )	<p>Cadets will be able to:</p> <ul style="list-style-type: none"><li>(a) Understand that drill as the foundation for discipline and to command a group for common goal</li><li>(b) Appreciate grace and dignity in the performance of arm drill</li><li>(c) Understand the concept and importance of social service.</li><li>(d) Understand the importance of a weapon its detailed safety precautions necessary for prevention of accidents.</li><li>(e) Actively participate in social service and community development activities.</li></ul>





<b>Course Content : Theory ( 1 Credit : 1hours, 25 Marks)</b>		
Unit	Description	Weightage* (%)
1.	<b><u>Unit 1. Personality Development</u></b> <ul style="list-style-type: none"><li>➤ Group Discussions - Change your Mindset</li><li>➤ Public Speaking.</li></ul>	25 %
2	<b><u>Unit 2. Leadership Development .</u></b> <ul style="list-style-type: none"><li>➤ Case Studies</li><li>➤ APJ Abdul Kalam,</li><li>➤ Deepa Malik,</li><li>➤ Maharana Pratap,</li><li>➤ N Narayan Murthy.</li></ul>	25 %
3	<b><u>Unit 3. Disaster management</u></b> <ul style="list-style-type: none"><li>➤ Disaster Management Capsule.</li><li>➤ Organisation.</li><li>➤ Types of Disasters.</li><li>➤ Essential Services.</li><li>➤ Assistance.</li><li>➤ Civil Defence Organisation.</li></ul>	25 %
4	<b><u>Unit 4. Adventure activities.</u></b> <ul style="list-style-type: none"><li>➤ Parasailing.</li><li>➤ Slithering.</li><li>➤ Rock Climbing.</li><li>➤ Cycling and Trekking.</li></ul>	25 %







<b>Course Content : Practical ( 1 Credit : 2 hours, 25 Marks)</b>		
Unit	Description	Weightage* (%)
1.	<b><u>Unit 1. Drill</u></b>  ➤ Arm Drill. ➤ Rifle ke saath Savdhan, Vishram aur Aram se. ➤ Rifle ke saath Parade Par aur Saj, Rifle ke saath Visarjan, Line Tod. ➤ Bhumi Shastra aur Uthao Shastra, Bagal Shastra aur Baju Shastra.	20 %
2	<b><u>Unit 2. Weapon Training</u></b>  ➤ Short Range firing.	20 %
3	<b><u>Unit 3- Map Reading</u></b>  ➤ Setting of Map. ➤ Findings North and Own Position.	15 %
4	<b><u>Unit 4- Field Craft &amp; Battle Craft</u></b>  ➤ Observation. ➤ Camouflage. ➤ Concealment.	15 %
5	<b><u>Unit 5- Social Service and Community Development</u></b>  Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, Swachhata Abhiyan, Constitution Day, Jan Jeevan Hariyali Abhiyan, Beti Bachao Beti Padhao etc.	15 %
6	<b><u>Unit 6. Obstacle Training(Contact Hrs. 05)</u></b>  ➤ Obstacle training - Introduction, Safety-measures, Benefits. ➤ Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- Zag Balance, High Wall.	15%





Teaching-Learning Methodology	ICT through <ul style="list-style-type: none"><li>➤ Power Point Presentation</li><li>➤ Audio-Visual Presentation</li><li>➤ Group Discussion</li><li>➤ Role Playing</li><li>➤ Case Study</li></ul>
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	External University Written Examination (As per CBCS R.6.8.3)	50 %
2.	External University Practical Examination in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%

Course Outcomes ( Theory )
<p><b><u>Expected Learning Outcomes.</u></b></p> <p>After completing this course, the cadets will be able to: -</p> <ul style="list-style-type: none"><li>(a) Admire and get inspired from the accomplishments of leaders from various walks of life.</li><li>(b) Develop public speaking skills.</li><li>(c) Understand the importance of positive mindset and optimistic attitude in life.</li><li>(d) Appreciate the need &amp; requirement for disaster management and his role in disaster management activities.</li><li>(e) Know the history &amp; geographical peculiarity of our borders &amp; coastal regions.</li></ul>





**Course Outcomes ( Practical )**

**Expected Learning Outcomes:**

After completing this course, the cadets will be able to: -

- (a) Perform arm drill gracefully.
- (b) Give and follow the different word of command.
- (c) Fire a weapon effectively with fair degree of marksmanship.
- (d) Different positioning for fire and aiming.
- (e) Use terrain effectively for concealment, camouflage, indicate landmarks and give field signals.
- (f) Observe surroundings in better way.
- (g) Develop the qualities of patience and confidence and become better individuals.
- (h) Will develop physical as well as mental fitness.

**Suggested References:**

Sr. No.	References
1.	Cadet's Hand Book Common Subject, All Wings, By DGNCC, New Delhi.
2.	Cadet's Hand Book Specialized Subject, Army, By DGNCC, New Delhi.
3.	Hand book of NCC by Kanti Publication, Etava U. P.
4.	Hand book of NCC by Ramesh Publishing house, New Delhi.

On-line resources to be used if available as reference material

On-line Resources

<https://indiancc.nic.in/dg-ncc-gen-aich>

<https://indiancc.mygov.in/>

DGNCC training App

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**SARDAR PATEL UNIVERSITY**  
**VallabhVidyanagar, Gujarat**  
**(Reaccredited with 'A' Grade by NAAC (CGPA 3.25)**  
**Syllabus with effect from the Academic Year 2022-2023**

(Bachelor of Science)(Undergraduate)

B. Sc. (UG) Semester -III

Course Code	<b>US03SPUH51</b>	Title of the Course	<b>PUBLIC HEALTH</b>
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	To make students familiar with: 1. General Concept of Public Health 2. Application of Public Health in the improvement of health of Individual as well as Society 3. Basic concepts related to Environmental Pollution , Family Planning and Vaccination
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Course Content		
Unit	Description	Weightage* (%)
1.	Definition of public health General concept of Public health Determinant of public health Indicator of public health	<b>25%</b>
2.	Community diseases Bacterial diseases Typhoid, Cholera, Diarrhea, TB Viral Diseases Jaundice, Small pox, Rabies, Polio Protozoan Diseases: Malaria Sexually transmitted diseases syphilis, Gonorrhea, AIDS	<b>25%</b>
3.	Main pillar of public health Air : Composition of Air, Environmental factor which purify air naturally air pollution, air purification, disease transmitted by polluted air Water : Composition of water, Sources of water, water pollution, diseases transmitted by water Solid waste Hazards : Definition of solid waste hazards, Dumping of solid hazards, Recycling & reuse of it. Sewage treatments	<b>25%</b>
4.	Factor influencing Health Vaccination Definition of vaccination, types of vaccines, important of vaccine Family planning, General concept of planning Different method of family planning.	<b>25%</b>

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	--
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	---
3.	University Examination	100 %

Course Outcomes: Having completed this course, the learner will be able to	
1.	From the study of this paper, student will learnt about basic concept of Public Health, Community Diseases and Environmental issues. This study will helpful to students in their personal hygiene, family planning, environmental awareness.
2.	Apply this knowledge in further studies of third year B.Sc. course.
Suggested References:	
Sr. No.	References
1.	Public Health by J B Vaidya
2.	Public health by B J Trunock 4 <sup>th</sup> ed
3.	A guide to hygiene & public health by Dr. A K Sharma & V R Bhatia
4.	Principles of public health practice [2 <sup>th</sup> ed] by Douglas, Sctuchfied, and William keck C.

On-line resources to be used if available as reference material
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On-line Resources: Google books, INFLIBNET, Google Web

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**BSc (Bachelor of Computer Science)**  
**BSc (Computer Science) (Semester-III)**

Course Code	<b>US03SICT51</b>	Title of the Course	<b>Information and Communication Technology - I</b>
Total Credits of the Course	<b>2</b>	Hours per Week	<b>2</b>
Course Objectives:	To study the 1. basics of computer systems 2. input/output devices 3. storage devices 4. fundamental concepts related to computer networks		

Course Content		
Unit	Description	Weightage* (%)
1.	<b>Basics of Computer System</b> <ul style="list-style-type: none"><li>– Introduction to a Computer System and its characteristics</li><li>– Basic Terminology: Hardware, Software, Firmware</li><li>– Components of general purpose computer system: I/O devices, CPU, Memory</li><li>– Generations of computer languages</li><li>– Introduction to Operating Systems: Windows, Linux</li></ul>	25
2.	<b>Input and Output Devices</b> <ul style="list-style-type: none"><li>– Input Devices: Keyboards, Numeric keypads, Pointing Devices (Mouse, touch pad), Joysticks, Touch screen, Scanner, Sensor Magnetic strip reader, Microphone, Barcode reader, Webcam, Light pen</li><li>– Output Devices: Monitors (CRT, TFT, LCD), Projectors, Printers (laser, desk jet, dot matrix), Speaker, Plotter</li></ul>	25
3.	<b>Storage Devices</b> <ul style="list-style-type: none"><li>– Importance and need of backup</li><li>– Storage Devices: Hard Disk, CD, DVD, Pen Drive, Memory Cards</li><li>– Comparative advantages and disadvantages of using different backing storage media.</li><li>– Difference between main(internal) memory and backing storage.</li></ul>	25





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4.	<b>Computer Networks</b> <ul style="list-style-type: none"><li>– Introduction to analog and digital data</li><li>– Need for conversion between analog and digital data</li><li>– Modem and its purpose</li><li>– Advantages and disadvantages of Computer Network</li><li>– Different types of network (LAN, MAN, WAN)</li><li>– Network Topology: (Bus, Star, Ring, Mesh, Hybrid)</li></ul>	25
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<b>Teaching-Learning Methodology</b>	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.
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<b>Evaluation Pattern</b>		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

<b>Course Outcomes: Having completed this course, the learner will be able to understand</b>	
1.	basics of computer systems
2.	input/output devices.
3.	storage devices.
4.	fundamental concepts related to computer networks.

<b>Suggested References:</b>	
Sr. No.	References
1.	Tanenbaum A.S. : Structured Computer Organization, Prentice-Hall of India Pvt. Ltd.
2.	Rajaraman V. : Computer Fundamentals, Prentice-Hall of India Pvt. Ltd.
3	Tanenbaum A. S., Computer Networks, Prentice-Hall of India Pvt. Ltd., New Delhi, 1997.

On-line resources to be used if available as reference material
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On-line Resources

1. <https://www.tutorialspoint.com/>

2. <https://www.w3schools.com/>

3. <https://www.javatpoint.com/>

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