

❖ **PROGRAMME OUTCOMES (PO's)**

PO - 1 Eligibility and Employability.

Main outcome of the programme is that after the course graduates become essentially eligible for employment in government as well as private sectors, create capability to acquire any reputed professional career in country and abroad. They will attain eligibility to successfully pursue their career objectives in advanced education, scientific career in government or industry, a teaching career in the education systems.

PO- 2 Logical and Analytic Thinking Ability

The graduate will acquire scientific temperament to analyze any problem he comes across by demonstrating logical and analytic thinking ability. The graduate will analyze situations, search for the truth and extract information, formulate and solve problems in a systematic and logical way. Become able to identify assumptions and checking out the degree to which these assumptions are accurate and valid. The assumptions are framed to learn thinking and actions.

PO-3 Communication efficiency.

The graduate will work and communicate efficiently in inter-disciplinary environment, either independently or in a team, and demonstrate leadership quality. Bachelors will speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO-4 Life-Long Learning

The graduate will understand the impact of science on society; will engage in life-long learning and professional development through self-study, continuing education or professional and doctoral level studies. The graduate will acquire proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

PO-5 Achievement of Earning

The science graduate will be able to perform job in diverse fields such as science, engineering, survey, education, banking, development-planning, business, public service, self-employment etc. where qualities of precision, analytical mind, logical thinking, clarity of thoughts and expression, systematic approach, qualitative and quantitative decision are required.

PO-6 Social Interaction and Effective citizenship.

Graduates will elicit views of others, mediate disagreement and help reach conclusions in group settings. Demonstrate empathetic social concern and equity centered national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PSO-7 Ethics

They become learned to recognize value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PSO-8 Environment and Sustainability.

Graduates will understand the issues of environmental contexts and sustainability development.

❖ CHOICE BASED CREDIT SYSTEM (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

❖ OUTLINE OF CHOICE BASED CREDIT SYSTEM:

1. Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a core course.

2. Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

2.1 Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

2.2 Dissertation/Project: An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.

3. Ability Enhancement Courses (AEC)/Competency Improvement Courses/Skill Development Courses/Foundation Course:

The Ability Enhancement (AE) Courses may be of two kinds: AE Compulsory Course (AECC) and AE Elective Course (AEEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement. They ((i) Environmental Science, (ii) English/MIL Communication) are

mandatory for all disciplines. AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

3.1 AE Compulsory Course (AECC):

Environmental Science, English Communication/MIL Communication.

3.2 AE Elective Course (AEEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instruction. Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.

B.Sc. PHYSICAL SCIENCE GENERAL STRUCTURE.

- Wherever there is practical there will be no tutorials and vice –versa.
- In case of theory and tutorial 1 credit will be of 1 hour class room teaching, while in case of Practical/Practical Skill Exam 1 credit will be of 2 hours Laboratory class/project work.

B.Sc. PHYSICAL SCIENCE GENERAL COURSE STRUCTURE			
Type of course	Courses	Credits	
		With Practical	With tutorial
I. CORE COURSE	(12 Papers) 04 Courses from each of the From 03 disciplines of choice (Physics, Chemistry & Mathematics.)	$12 \times 4 = 48$	$12 \times 5 = 60$
CORE COURSE PRACTICAL / TUTORIAL	(12 Practical/ Tutorials) 04 Courses from each of the From 03 Disciplines of choice (Physics, Chemistry & mathematics.)	$12 \times 2 = 24$	$12 \times 1 = 12$
II. DISCIPLINE SPECIFIC COURSE ELECTIVE COURSE	(6 Papers) Two papers from each discipline of choice including paper of interdisciplinary nature. There is optional dissertation or project work in place of one Discipline elective paper (6 credits) in 3rdYear.Than there will be 5 total papers and 1 dissertation of any one subject, subject in which dissertation is opted 1 Discipline elective paper with practical or tutorial will be included.	$6 \times 4 = 24$ (if dissertation opted in any one of the three discipline than credits will be $5 \times 4 = 20$ Plus $6 \times 6 = 6$)	$6 \times 5 = 30$ (if dissertation opted in any one of the three discipline than credits will be $5 \times 5 = 25$
DISCIPLINE SPECIFIC COURSE PRACTICAL / TUTORIALS.	(6 Practical / Tutorials) Two Papers from each discipline of choice including paper of interdisciplinary nature.	$6 \times 2 = 12$ (if dissertation opted in any one of the three discipline than credits will be $5 \times 2 = 10$	$6 \times 1 = 6$ (if dissertation opted in any one of the three discipline than credits will be $5 \times 1 = 5$
III. ABILITY ENHANCEMENT COURSES: 1. Ability Enhancement Compulsory.	2 Papers of 4 credits each Environmental Science English/MIL Communication	$4 \times 2 = 8$	$4 \times 2 = 8$
2.SKILL ENHANCEMENT COURSE (Skill Based)	4 Papers of 4 credits from 03 disciplines.	$4 \times 4 = 16$	$4 \times 4 = 16$
Total	42 papers (Theory + Practical + Tutorial)	132	132

B.Sc. PHYSICAL SCIENCE DETAILED COURSE STRUCTURE

Course type Course Code	Course Title	Credit	ESE	CCA	Max. Mark	Exam. Duration Hours.
YEAR-I						
A.E.C. COURSE-I	Environmental Science	4	80	20	100	3
A.E.C. COURSE-II	English	4	80	20	100	3
CORE COURSE-I PHYS101TH & IA	Mechanics Theory	4	50	30	80	3
PHYS101PR	Mechanics Lab	2	20	-	20	3
CORE COURSE-II CHEM101TH & IA	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons	4	50	30	80	3
CHEM101PR	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons Lab	2	20	-	20	3
CORE COURSE-III MATH101TH&IA	Differential Calculus	6	70	30	100	3
CORE COURSE-IV PHYS102TH & IA	Electricity Magnetism & EMT	4	50	30	80	3
PHYS102PR	Electricity Magnetism & EMT Lab	2	20	-	20	3
CORE COURSE-V CHEM 102TH & IA	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry	4	50	30	80	3
CHEM 102 PR	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry	2	20	-	20	3
CORE COURSE-VI MATH102TH & IA	Differential Equations	6	70	30	100	3
Total		44			800	
YEAR-II						
CORE COURSE-VII PHYS201TH & IA	Statistical Mechanics & Thermal Physics &	4	50	30	80	3
PHYS201PR	Statistical Mechanics & Thermal Physics &	2	20	-	20	3
CORE COURSE-VIII CHEM 201TH& IA	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry	4	50	30	80	3
CHEM 201PR	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry Lab.	2	20	-	20	3
CORE COURSE-IX MATH201TH & IA	Real Analysis	6	70	30	100	3
CORE COURSE-X PHYS201TH& IA	Waves & Optics Theory	4	50	30	80	3
PHYS201PR	Waves & Optics lab.	2	20	-	20	3
CORE COURSE-XI CHEM 202 TH & IA	Coordination Chemistry, States Matter & Chemical Kinetics	4	50	30	80	3
CHEM 202 PR	Coordination Chemistry, States Matter & Chemical Kinetics Lab	2	20	-	20	3
CORE COURSE-XII MATH202TH & IA	Algebra	6	70	30	100	3

Skill Enhancement Course (SEC-I) PHYS204TH&IA OR PHYS205TH&IA	Computational Physics Or Electrical Circuits And Network Skills Theory Basic	3	70	30	100	3
Skill Enhancement PHYS204SE OR PHYS205SE	Computational Physics skill exam. OR Electrical Circuits And Network Skills Theory Basic skill exam.	1	-	-	-	2
SEC-II CHEM203TH	Basic Analytical Chemistry	3	70	30	100	3
CHEM203SE	Basic Analytical Chemistry	1	-	-	-	2
Total		44			800	
YEAR-III						
DISCIPLINE SPECIFIC ELECTIVE COURSES DSE-1A PHYS301TH&IA OR PHYS302TH& IA	Elements of Modern Physics OR Solid State Physics and Electronics	4	50	30	80	3
DSE-1A PHYS301PR OR PHYS302PR	Elements of Modern Physics OR Solid State Physics and Electronics	2	20	-	20	3
DSE-2A CHEM301TH&IA	Polynuclear hydrocarbons and UV, IR spectroscopy lab.	4	50	30	80	3
CHEM301PR	Polynuclear hydrocarbons and UV, IR spectroscopy lab.	2	20	-	20	3
DSE -3A MATH301TH&IA	Linear Algebra	6	70	30	100	3
DSE-1B PHYS304TH,IA &TU OR PHYS305TH&IA OR PHYS306TH&IA	Nuclear And Particle Physics	5	50	30	80	3
	Quantum Mechanics OR PHYSICS OF DEVICES AND INSTRUMENTS Theory	4	50	30	80	3
DSE-1B PHYS304PR&IA PHYS304PR ,IA&TU OR PHYS305PR &IA OR PHYS306PR&IA	Nuclear And Particle Physics	1	-	-	-	-
		2	20	-	20	3

DSE-2B CHEM 305TH&IA	Polymer Chemistry Lab.	4	50	30	80	3
CHEM 305PR	Polymer Chemistry Lab.	2	20	-	20	3
DSE-3B MATH304TH&IA	Numerical Methods	6	70	30	100	3
SEC- 3 MATH 316TH&IA	Theory of Equations.	4	70	30	100	3
SEC- 4 PHYS204TH&IA OR PHYS205TH&IA OR CHEM 308 TH &IA OR MATH 316 TH&IA	Computational Physics Theory OR Electrical Circuits And Network Skills Theory Basic. OR Pesticide Chemistry & Pharmaceutical Chemistry OR Theory of Equations.	3	70	30	100	3
SEC- 4 PHYS204SE OR PHYS205SE OR CHEM 308 SE OR MATH 316 SE	Computational Physics Theory OR Electrical Circuits And Network Skills Theory Basic. OR Pesticide Chemistry & Pharmaceutical Chemistry OR Theory of Equations.	1	-	-	-	2
Total		44			800	
Total I,II &III year		132			2400	

B.Sc. PHYSICAL SCIENCE COURSES OUTCOMES.

Course Code	Course Title	Course Outcome
YEAR-I		
A.E.C. COURSE-I	Environmental Science	These courses are the courses based upon the content that leads to Knowledge enhancement. And are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills etc. in English and/Hindi and Environment science.
A.E.C. COURSE-II	English	These courses are the courses based upon the content that leads to Knowledge enhancement. And are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills etc. in English and/Hindi and Environment science.
CORE COURSE-I PHYMS101TH	Mechanics Theory	<p align="center">Mechanics Theory</p> <p>Student should be able to:</p> <ul style="list-style-type: none"> • Formulate general mechanics parameters and distinguish between central and non-central forces. • To study Laws of Motion. • To study about planetary motion. • To study Simple harmonic motion. • Concept of Elasticity. • Special theory of Relativity.
CORE COURSE-II CHEM 101 TH	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons	<ul style="list-style-type: none"> • Knows about Atomic structure quantum model. Bohrs Theory and its limitations, Schrodinger Wave Equation and its function, quantum numbers. Slater rules and its applications and limitations. • Lattice energy and its application, Born-Haber cycle and its application. Shapes of molecules on the basis of valence bond theory and valence shell electron pair repulsion theory. • Explains ionic and covalent bonding with VBT and VESPER Theory and • Detailed description of Molecular orbital theory with homonuclear and heteronuclear diatomic molecules. • Physical effects and electronic displacement in organic molecules. • Reactive intermediates. • Conformational, optical and geometrical type of stereoisomerism and assignment of configuration • Preparation reaction and structure of alkenes, alkenes and alkynes.

		<ul style="list-style-type: none"> Students will also know and recall the fundamental principles of organic chemistry that include chemical bonding, nomenclature, structural isomerism, stereochemistry, chemical reactions and mechanism.
CHEM 101 PR	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons	<p>Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons Lab</p> <ul style="list-style-type: none"> Experimentally performs volumetric determination by neutralisation and redox titrations this provokes analytical skills in students. In organic qualitative analysis to detect the extra element nitrogen, sulphur and halogens present in the organic compound To separate the mixture by chromatography prepares students to learn separations using this technique in industrial as well as medical areas. Students will employ critical thinking to carry out, record and analyze the results of chemical experiments. They will demonstrate proficiency in the use of appropriate instrumentation to collect and record data from chemical experiments.
CORE COURSE-III MATH101TH MATH101IA	Differential Calculus	<p>Differential Calculus</p> <ul style="list-style-type: none"> Use of $\epsilon - \delta$ definition to find the limits and continuity of functions. Study relationship between continuation and differentiation. Able to understand the idea of limits of functions by L- hospitals rule Learn the proofs of general theorem and their geometrical consequences. Learns the notation of concavity convexity asymptotes. Are able to trace the curves in polar and rectangular coordinates. Understands the concepts of limit and continuity of functions of several variables. Are able to convert Cartesian to polar coordinates and vice versa. Learn the proof and applications of Euler's theorem on homogeneous functions Are able to calculate Jacobians'.
CORE COURSE-IV PHYS102TH PHYS102IA	Electricity Magnetism & EMT	<p>Student should be able to:</p> <ul style="list-style-type: none"> Explain the basic electric and magnetic interactions due to charged particles and currents Describe how the electric interactions due to single or collection of charged particles are embodied in the concepts of the electric field and the electric potential Predict the motion of charged particles in electric and magnetic fields Explain the basic physics of capacitors and resistors Predict the behavior of simple and complex direct current circuits using the fundamental conservation laws.

CORE COURSE-V CHEM 102TH & IA	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry	<ul style="list-style-type: none"> • Basic laws and principles of Thermodynamics make students to understand working of engines, machines, radiators and also different types of power plants. • Detailed description of chemical equilibrium, Concepts of weak and strong electrolyte and Buffer solution impart insight to understand solution chemical properties. • Preparation, Chemical reaction, chemical properties and electrophilic substitution of aromatic hydrocarbon. • Preparation and chemical reaction of Alkyl halide, alcohol and phenol, aldehydes and ketones root into the understanding of their physical and chemical properties.
CHEM 102PR	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry Lab.	<ul style="list-style-type: none"> • Enthalpy of neutralization of HCl with NaOH, ionization of acetic acid and hydration of copper sulphate. • Heat capacity of calorimeter. • The students develop keen interest in the basic concepts of thermodynamics. • To determine the pH value of different solution using pH-meter and preparation of the buffer solution, measurement of their pH- values imbibe the deep knowledge of pH and its role in our daily life. • The synthesis and purification of the organic compounds by crystallization and distillation are designed to develop synthetic and purification skills in students.
CORE COURSE-VI MATH102TH & IA	Differential Equations	<ul style="list-style-type: none"> • Understands basic definitions and terminology associated with ordinary differential equations. • Learn rules to find integrating factors. • Distinguish between linear and non linear, ordinary and partial differential equations. • Recognize and solve homogeneous and non homogeneous equations by different methods • Students are able to apply the methods of variation of parameters and reduction of order. • Use working to determine linear dependence and linear independent of functions. • Learns to solve Cauchy Euler's equations. • Learn the concepts of total differential equations. • Can form partial differential equations of first order and use Lagrange's methods to solve partial differential equations. • Are able to find solutions of partial differential equations by Charpit's method. • Learn to classify second order partial differential equation through illustration only.
YEAR-II		
CORE COURSE-VII PHYS201TH PHYS201IA	Thermal Physics & Statistical Mechanics	<p>Student should be able to:</p> <ul style="list-style-type: none"> • To study physical behavior of an assembly of large number of particles using concept of Physics.

		<ul style="list-style-type: none"> • To apply distribution function to quantum and classical systems • To evaluate thermal properties of solids using statistical approach. • To understand concept of heat death of Universe. • Derive thermodynamic parameters and apply fundamental laws to solve thermodynamic problems • Application of Maxwell's equations. • To understand low temperature Physics.
CORE COURSE-VIII CHEM 201TH	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry	<ul style="list-style-type: none"> • Using concepts of distribution law & phase equilibrium able to describe one or multi component system, salt hydrolysis, distribution indicator and also extraction of metal from its ores. • Study Basic concepts and applications of electrochemistry. • Study preparations, physical and chemical properties of carboxylic acids, their derivatives, amines and diazonium salt. • Understand ideal and non ideal solutions as well as the basic concept in phase equilibrium. • Know about different type of conductometric and potentiometric titration.
CHEM 201TH	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry	<ul style="list-style-type: none"> • Study of distribution law and its applications. • To determine cell constant and equivalent conductance of weak acids • To perform conductometric and potentiometric titrations • To estimate the given functional group present in an organic compound qualitatively. • With the help of these experiments students come to know about the advantage of conductometric and potentiometric titrations over visually performed titrations. • They can analyze the given organic functional group present in an organic compound qualitatively.
CORE COURSE-IX MATH201TH MATH201IA	Real Analysis	<ul style="list-style-type: none"> • Define and recognize sequence and series of real numbers and their conversions and uniform conversions • Recognize the difference between point wise conversions and uniform conversions of sequence of function. • Use comparison, condensation, ratio, root condensation and Leibnitz's test for conversion of series. • Construct mathematical proofs of basic results in real analysis • are able to comprehend bounded sets ,Archimedean properties and Bolzano-Weierstrass theorem • Students can produce proofs of results of real analysis.

<p>Skill Enhancement Course (SEC-I) PHYS203TH OR PHYS204TH OR PHYS205TH</p>	<p>Physics Workshop Skills OR Computational Physics OR Electrical Circuits And Network Skills Theory Basic</p>	<p>Physics Workshop Skills Student should be able to: This Physics workshop skill enhancement course develop the basic skills of the students such as measurement of the lengths, areas and volumes of objects of different sizes ranging from fraction of millimeter to kilometers. This course also develop the skill to understand about the different systems of welding and repairing metal parts as well as working mechanism of pulley, gears, lifts and breaking systems of vehicles. Other part of the course develops the understanding of fault finding and repairing of electronic circuits.</p> <p>OR</p> <p>Computational Physics Skills Student should be able to: This course develops the capability of students to make the use of computers towards problem solving in physics and mathematics by learning algorithm development, forming its flowcharts and making computer programs. This course also develop the capability of using the computers for simulating problems in computer, making graphic presentation of data, word processing by using scientific word processor so as to produce papers, thesis, power presentations and pdf files Student should be able to:</p> <p>Basic Analytical Chemistry</p> <ul style="list-style-type: none"> • Skill enhancement course are designed to increase the mental and experimental skills of students in chemistry. • Students know the analysis methods and analytical principles. • This course develops the analytical thinking and awareness, includes basic analytical terms and its applications to soil, food and environment. • A part of this course develops industrial skills and awareness regarding adulterations, contaminants and pollutants etc.
<p>CHEM203TH</p>	<p>Basic Analytical Chemistry</p>	<p>Student should be able to:</p> <ul style="list-style-type: none"> • Concept of Viscosity. • To understand electromagnetic nature of Light. • Analyze the intensity variation of light due to Polarization, interference and diffraction. • Explain working principle of lasers • Explain types of waves and interference of light
<p>CORE COURSE-X PHYS201TH</p>	<p>Waves and Optics</p>	<p>Student should be able to:</p> <ul style="list-style-type: none"> • General group trends within transition elements, lanthanides and actinides. • Detail description of Valence Bond, Crystal Field Theory, with special reference with C No. 4 and 6. • Transition elements play a crucial role in industrial catalytic processes that are required to produce substances and new materials at a rate far exceeding
<p>CORE COURSE-XI CHEM 202 TH CHEM 202 IA</p>	<p>Coordination Chemistry, States Matter & Chemical Kinetics</p>	<p>Student should be able to:</p> <ul style="list-style-type: none"> • General group trends within transition elements, lanthanides and actinides. • Detail description of Valence Bond, Crystal Field Theory, with special reference with C No. 4 and 6. • Transition elements play a crucial role in industrial catalytic processes that are required to produce substances and new materials at a rate far exceeding

		<p>that of natural chemical reaction.</p> <ul style="list-style-type: none"> • Detail description of Chemical Kinetics. Theories of Reaction Rates and their comparison.
CHEM 202 PR	Coordination Chemistry, States Matter & Chemical Kinetics Lab	<ul style="list-style-type: none"> • Semi-micro qualitative analysis of inorganic mixture. • Gravimetric estimation of metal ion. • Detail description of colorimetric, complexometric titrations and measurement of surface tension and viscosity. • Experimental study of chemical kinetics. • From this lab course students learn about analysis of unknown inorganic compounds, gravimetric estimation of metal ion, colorimetric, complexometric titration. • They also got knowledge about measurements of surface tension and viscosity and experimental study of kinetics of reaction by different methods.
CORE COURSE-XII MATH202TH MATH202IA	Algebra	<ul style="list-style-type: none"> • Study the definition of groups rings and fields. • Are able to understand concept if subgroups, normal subgroups and quotient groups. • Use concepts of homomorphism isomorphism and endomorphism for group sand rings. • Use canonical types of groups like cyclic groups ,permutation groups and rings such as polynomial rings and quotient rings • Are able to find cossets and related theorem. • Produce groups of theorem on algebra.
YEAR-III		
Discipline Specific Elective Course DSE-1A PHYS301TH OR PHYS302TH OR PHYS303TH	Elements of Modern Physics OR Solid State Physics and Electronics OR Astronomy and astrophysics Theory	<p style="text-align: center;">Elements of Modern Physics</p> <p>Student should be able to:</p> <ul style="list-style-type: none"> • Explain fundamentals of quantum mechanics and apply to one dimensional motion of particles • Calculate Q-value of nuclear reactions and describe particle detectors and accelerators. <p style="text-align: center;">Solid State Physics and electronics</p> <p>Student should be able to:</p> <ul style="list-style-type: none"> • To analyze the structural properties of elemental solids such as inter atomic spacing, Brillouine Zones. • Lattice Vibrations to understand phonons behaviors to explain the propagations of elastic waves and hence Specific Heats of solids. • To study free electron behavior in metals. • To apply distribution function to quantum and classical systems. • BCS theory of superconductivity. <p style="text-align: center;">Astronomy and Astrophysics</p> <p>Student should be able to:</p> <ul style="list-style-type: none"> • Formulate general parameters distance, time brightness, temperature.

		<ul style="list-style-type: none"> • Study about planets, stars their orbits. • Study about telescopes such as reflecting telescope, space telescope, detectors. • Study about milky-way, dark matter, nature of spiral arms. • Study of Hubble classification of galaxies, gas and dust in galaxies. • Study of Hubble Law and dark matter.
DSE-2A CHEM301TH	Polynuclear hydrocarbons and UV, IR spectroscopy lab.	<ul style="list-style-type: none"> • Understand heteronuclear chemistry involving aromatic compound, their properties • Application of UV, IR spectroscopy in organic molecules to characterize organic molecules.
CHEM301PR	Polynuclear hydrocarbons and UV, IR spectroscopy lab	<ul style="list-style-type: none"> • Become able to detect the given function group present in organic compound by qualitative analysis. Able to separate ion and mixture by the use of chromatographic technique. Able to prepare complexes and measure their conductivity.
DSE -3A MATH301TH	Linear Algebra	<p style="text-align: center;">Linear Algebra</p> <ul style="list-style-type: none"> • Analysis vectors in R^n algebraically • Learn the concepts of linear independence and dependence, linear span basis and dimensions. • Study vector spaces and subspaces. • Use matrix algebra and relate matrices to linear transformations. • Study inner product spaces and Cauchy Schwarz's inequality.
DSE-1B PHYS304TH PHYS304 IA & TU OR PHYS305TH OR PHYS306TH	Nuclear And Particle Physics OR Quantum Mechanics OR Physics of Devices and Instruments Theory	<p style="text-align: center;">Nuclear and Particle Physics</p> <p>Student should be able to:</p> <ul style="list-style-type: none"> • Study of general properties of nucleus and its different models • Basic understanding of Radio-activity and its use. • Types of nuclear reaction and its applications. • Interaction of radiations with matter. • Particle accelerators. • Basic idea of elementary particles. <p style="text-align: center;">Quantum mechanics</p> <p>Student should be able to:</p> <ul style="list-style-type: none"> • Study time dependent and independent Schrödinger wave equation. • Properties of wave function, uncertainty principle. • General discussion of bound state in an arbitrary potential. • Quantum theory of Hydrogen like atom, atoms in electric and magnetic fields. Normal and anomalous Zeeman Effect. • Pauli's exclusion principle, spin orbit couplings. <p style="text-align: center;">OR</p> <p>Physics of devices and Instruments theory</p>

DSE-2B CHEM 305	Polymer Chemistry	<ul style="list-style-type: none"> • Classification and nomenclature chemical bonding and formation of polymers • Polymerization process functionality and texture of polymers. Bi and poly functional system. • Mechanism and kinetic of different types of polymerization and co polymerization, Detail description of crystallizations and crystallinity • Nature and structure of polymers and their properties. • Determination, distribution and significance of molecular weight of polymers. • Detail description of glass transition temperature. • Detail description of polymer solution. • Physical, thermal flow and mechanical properties of polymers • Brief introduction, to preparation structure and properties application of various types of polymers. • Polymers are used in broad range of industries such as textiles; packaging, stationary, plastics, air craft, ropes, toys and construction to date the importance of polymer have been much more highlighted because of their application in different dominions of sciences technologies and industries for basic uses to biopolymers and therapeutics polymers
DSE-2B CHEM 305PR	Polymer Chemistry	<p style="text-align: center;">Polymer Chemistry Lab</p> <ul style="list-style-type: none"> • Polymer Synthesis & Characterization. • Determination of molecular weight by different methods. • Polymer synthesis provides a root to the formation of plastics, biosynthesis of proteins and highly polymeric carbohydrates. <p>Polymer Characterization is important for the synthesis of new materials their evaluation and improvement in performance.</p>
DSE-3B MATH304 TH	Numerical Methods	<p style="text-align: center;">Numerical Analysis</p> <ul style="list-style-type: none"> • Study to find the approximate rules of non linear equation s by using different methods such as bisection, secant and Newton Repson method. • How to find missing numbers from the available data and the estimate value of known quantity between the two known quantities. • To find the value of definite integral from set of tabulated values of the integrand by using trapezoidal and Simpsons rule.
SEC- 3 MATH 316 TH	Theory of Equations	<p style="text-align: center;">Theory of Equations</p> <ul style="list-style-type: none"> • Students will be familiar with general properties of polynomials and their graphical representation. • Will be able to compute maximum and minimum values of polynomials. • Will gain the ability to use Descartes role of science

		<p>for positive and negative roots.</p> <ul style="list-style-type: none"> • Will come to know about the concept of symmetric functions. • Will use transformation of equations and will be able to find solutions of binomial and reciprocal equations. • Students will gain the ability to find algebraic solutions of cubic and biquadrate's.
<p>SEC- 4 PHYS204TH OR PHYS205TH OR</p>	<p>Computational Physics Theory OR Electrical Circuits And Network Skills Theory Basic.</p>	<p>Computational Physics Skills Student should be able to: This course develops the capability of students to make the use of computers towards problem solving in physics and mathematics by learning algorithm development, forming its flowcharts and making computer programs. This course also develop the capability of using the computers for simulating problems in computer, making graphic presentation of data, word processing by using scientific word processor so as to produce papers, thesis, power presentations and pdf files.</p>
<p>CHEM 308</p>	<p>Pesticide Chemistry & Pharmaceutical Chemistry</p>	<p>OR Pesticide Chemistry & Pharmaceutical Chemistry • Introduction to pesticides, benefits and adverse effects of pesticides, structure activity relationship in pesticides; can easily be recognized by knowing about them. • Synthesis uses of pesticides in organochlorines, organophosphates, carbamates, anillides and quinines. • Synthesis of various classes of drugs, design and development.. • They come to know about synthesis of some vitamins.</p>
<p>OR</p>	<p>OR</p>	<p>OR Theory of Equations • Students will be familiar with general properties of polynomials and their graphical representation. • Will be able to compute maximum and minimum values of polynomials. • Will gain the ability to use Descartes role of science for positive and negative roots. • Will come to know about the concept of symmetric functions. • Will use transformation of equations and will be able to find solutions of binomial and reciprocal equations. • Students will gain the ability to find algebraic solutions of cubic and biquadrate's.</p>
<p>MATH 316TH</p>	<p>Theory of Equations.</p>	

❖ **PROGRAMME SPECIFIC OUTCOMES (PHYSICS) (PSOs)**

Physics Department of M. L. S. M. College Sundernagar trains the students to understand basic concept of Physics. In this department, education means enrichment of principles of Physics along with overall personality development. The outcome is that our students are at par with the best of institutes of the state. As part of the preparation process, the Physics department faculty, has adopted the specific program outcomes to be achieved at the Physics department are as follows:

- ✓ An ability to apply knowledge of mathematics and science.
- ✓ An ability to design and conduct experiments, as well as to analyze and interpret data.
- ✓ An ability to function on multi-disciplinary teams.
- ✓ An ability to identify, formulate, and solve Physics problems.
- ✓ An ability to communicate effectively.
- ✓ The broad education necessary to understand the impact of Physics in a global, economic, environmental, and social context.
- ✓ Recognition of the need for, and an ability to engage in life-long learning.
- ✓ An ability to use the techniques, skills, and modern tools necessary for science practice.

Students graduating with B.Sc. with Physics should be able to:

- ✓ Apply the basic laws of physics in the areas of classical mechanics, Newtonian gravitation, special relativity, electromagnetism, geometrical and physical optics, quantum mechanics, thermodynamics and statistical mechanics.
- ✓ Recognize how observation, experiment and theory work together to continue to expand the frontiers of knowledge of the physical universe.
- ✓ Apply basic mathematical tools commonly used in physics, including elementary probability theory, differential and integral calculus, vector calculus, ordinary differential equations, partial differential equations, and linear algebra.
- ✓ Use basic laboratory data analysis techniques, including distinguishing statistical and systematic errors, propagating errors, and representing data graphically.
- ✓ Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- ✓ *In addition, students graduating with B.Sc. with Physics should be able to:*
- ✓ Apply more advanced mathematical tools, including Fourier series and transforms, abstract linear algebra, and functions of a complex variable.
- ✓ Use classic experimental techniques and modern measurement technology, including analog electronics, computer data acquisition, laboratory test equipment, optics, lasers, and detectors.

❖ **PROGRAMME SPECIFIC OUTCOMES: CHEMISTRY**

- ✓ **PSO-1** Graduates will have strong foundations in basic principles and theories of the main areas of the organic, inorganic, analytical, physical and biological chemistry and will be able to apply chemical knowledge in many applications.
- ✓ **PSO-2** After completion one will be able to solve problems by identifying the typical parts of a problem and works with a strategy. They could to apply appropriate techniques to achieve a solution, correctness and interpretation of calculated results.
- ✓ **PSO-3** Graduates will be to use computers in data acquisition and processing and use available software as a tool in data analysis. They could use modern library search tools to locate and retrieve scientific information about a topic, chemical, chemical technique, or an issue relating to chemistry.
- ✓ **PSO-4** B.Sc. Chemistry graduates know proper regulations and procedures for safe handling storage and use of chemicals. Hence will become eco-friendly and eco-protective, an ability to determine hazards associated with carrying out chemical experiments in terms of chemical toxicity, chemical

stability and chemical reactivity and be able to find information to enable effective risk assessments to be carried out.

- ✓ **PSO-5** understands the ethical, historic, philosophical, and environmental dimensions of problems.
- ✓ **PSO-6** Graduates will be able to use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments, as well as interpretation of data generated in instrumental chemical analyses upon completion of a B. Sc degree in Chemistry.
- ✓ **PSO-7** Learns skills in the employment of common conventions and standards in scientific writing, data presentation, and referencing literature; numeracy and mathematical skills, including handling data, algebra, functions, trigonometry, calculus, vectors and complex numbers, alongside error analysis, order-of-magnitude estimations, systematic use of scientific units and different types of data presentation.

❖ **PROGRAMME SPECIFIC OUTCOMES OF B.Sc. AND B.A .MATH**

PSO-1 On the successful completion of the course, the graduates understands the concepts of calculus (Differential and integral, differential equations (ordinary and partial, algebra (abstract, linear) and analysis (real, complex and numerical) and mechanics.

PSO-2 Read, understand and construct correct mathematical proofs

PSO-3 Develop power of reasoning, critical thinking, problem solving ability, developing new ideas, drawing logical conclusions and high level of numeracy.

PSO-4 Explains the importance of math and its techniques to solve real life problems.

PSO-5 Able to communicate effectively both orally and in writing.

PSO-6 Develop skills in analyzing and interpreting data.

PSO-7 Graduates of math programme will be able to apply their knowledge in modern industry, teaching and other fields such as MBA, MCA, Mathematical Computing and research.

PSO-8 Studying math simply opens the doors to a wealth of opportunities.

❖ **ATTAINMENT OF PROGRAM OUTCOME.**

The scheme developed for the programme and the curriculum laid down for every subject is designed in a way to achieve academic excellence and meet the requirements of stakeholders and all-in-all move towards the attainment of department as well as University Mission

Administrative system helps in ensuring the Achievement of PSOs

- ✚ Lectures are delivered primarily through chalk and talk.
- ✚ Tutorial supplements the lecture by providing exercises and example problems to enhance the understanding.
- ✚ Written assignments, two class tests, asking questions in between the lectures, participation in classroom, discussions.
- ✚ The POs, PSOs and COs Objectives are determined and evaluated through a regular examination process, Class Tests, Seminars and consultation that involve four core constituents: Students, Alumni, PTA, and Faculty.
- ✚ Regular departmental meetings (Physics, Chemistry and Mathematics) are held which is presided by respective HOD and all agenda of improvement of academics are discussed to achieve the PSOs.

- ✚ Concerned faculty keeps a check on the students not only in academic matters but also in their personal and emotional affairs.
- ✚ The faculty keeps a vigilant eye on course structure and suggests the changes to the University as and when required.
- ✚ Student input is obtained through student feedback, interaction with College Student Central Association (CSCA), exit interviews with graduating students, student evaluation forms, and individual faculty-student advisee interaction.
- ✚ Alumni /PTA input is obtained through regular meetings with alumni/PTA representatives, and exit surveys with graduating students.
- ✚ Faculty input is obtained through departmental committees, regular faculty meetings, and departmental retreats.
- ✚ Student input is taken on regular basis at the end of each semester.

Attainment of each of the PSOs and COs can be judged from the following:

- ✓ Increase in pass percentage of students.
- ✓ Percentage of students qualifying GRE, GATE, TOEFEL and other competitive exams is increasing.
- ✓ Rise in the number of students going for PG programme in reputed institutions in India and abroad.
- ✓ Increase in number of placement per student and in better industries after the completion of the degree programme.
- ✓ Percentage of failures in different courses is reducing every year.