COURSE OUTCOMES OF M.SC. CHEMISTRY	
CourseCode & Title	**Course outcomes**
	SEMESTER I
Course -I Inorganic Chemistry	**Unit: I Group Theory**. • Learn about symmetry elements and its application in chemistry also become trained to apply group theory to determine various chemical properties, structure and bonding aspects of chemical molecules. **Unit: II Non Aqueous Solvents.** • Students will understand chemical and physical properties of these solvents and their advantage over aqueous solvents and will appreciate the role of these solvents for synthesis and stabilization of unusual compounds, complex and chemical species. **Unit: III Inorganic Hydrides.** • Recall of various theories of bonding. • Enable students to understand polyhedral skeletal electron pair theory,Wade's rule and Wade's Mingos rule • A deep understanding of application of polyhedral skeletal electron pair theory to describe bonding in cluster compounds. • Students will be able to explore a new area of research in cluster compounds **UNIT: III Organic Reagents in Inorganic Chemistry.** • Students will be able to understand the role of organic reagents in chemical and physicochemical methods of analysis. • Postgraduates will have deep understanding of masking, demasking reagents and other auxiliary operations of analysis and they will appreciate role of organic reagents in various fields like, industries, medicine and agriculture. **Unit:V Supramolecular Chemistry.** • Become able to understand nature and natural phenomenon like DNA transcription, translation, photosynthesis etc. • Discussion of basic supramolecular concepts and principles, receptor design principles and techniques are keys which opens doors to many chemical fields, viz. modern electronic, industrial, medicinal and catalytic fields.

Course II Organic Chemistry	**UNIT-I: Supramolecular Chemistry** • Students able to learn bonding other than covalent bond, addition compounds and their applications. • Extending the basic concepts of non covalent interactions and their essential role in areas of modern Chemistry, biochemistry, medical medicinal chemistry and other areas of biology. **UNIT-II Stereochemistry** • Understand the stereoisomer's and their properties, optical activity, stereospecific and stereoselective reactions, chirality, asymmetric synthesis. • The knowledge of compounds existing in different stereoisomerism forms having different physical, chemical and biological properties and hence applications in, medicinal, catalysis, synthesis and biological systems. **UNIT-III Reaction mechanism:** • Structure and reactivity, thermodynamic and kinetic requirements. Hammond postulate, Transition states and intermediates. Effect of structure reactivity. • Understanding the thermodynamic and kinetic requirements reaction conditions, transition states, intermediates formed during the course of reaction and applying the same knowledge for laboratory at industrial synthesis of complex compounds. **UNIT-IV Aliphatic Nucleophilic Substitution** • Students able to understand different kinds of organic reactions such as SN^1, SN^2, SET and SNi mechanism and factors affecting these reactions. Neighboring group mechanism, PTC, ultrasound and regioselectivity. • Exploring the basic chemical nature of aliphatic organic compound having electron deficient centre. • Types of reactions exhibited by different families of organic compounds. **UNIT-V Aliphatic Electrophilic Substitution and Free radical reactions.** • Get the knowledge of Bimolecular mechanism and factors affecting them radical reactions, related name reactions. • Understanding the chemical behavior of aliphatic organic compounds exhibiting polar and nonpolar characters. • Applying these concepts in industrial applications via green protocol to achieve environment friendly growth.
Course III Physical Chemistry	**UNIT I** • Students will develop problem-solving skills by identifying the molecular structure of organic compounds using multiple spectrometric techniques including NMR, ESR and Mossbauer able to determine activation energy to understand exchange reactions. **UNIT II** • Using rotational and vibrational spectra &basics of Raman spectra able to identify unknown compounds & their structures. **UNIT III & UNIT IV** • Study of different theories and processes of chemical kinetics help students to understand the different steps occur during chemical reactions and chemical processes e.g. food decomposition, microorganism growth, ozone decomposition, formation of polymers and water transport across cell membrane.

	UNIT V • Able to understand combustion, neutralization or precipitation reactions using fast reaction concept.
Course IV Mathematics for Chemists and Application of Computer in Chemistry	**UNIT I, II& III** • With basic knowledge of mathematics i.e. differential & integral calculus, coordinate system, vectors, matrices& determinants students will be prepared to deal with the concepts and theories of chemistry like quantum, statistical, kinetics, thermodynamics & group theory etc. **Unit IV & V** • This course develops capability of students to make the use of computers towards problem solving in chemistry and mathematics by learning algorithm term development forming their flow charts and making computer programme.
	SEMESTER-II
Course V Inorganic Chemistry	**UNIT: I Metal ligand bonding** • Understanding of basic theories (VBT, MOT) and advanced theories (CFT, ACFT or LFT)of metal ligand bonding • Enable students to understand complex bonding and distortion in regular geometries. • Students will become able to apply different theories to understand different physical and chemical properties of complexes. • With deep knowledge of CFT students will be able to characterize spinels, inverse spinels which are of very much use in magnetic recording media **UNIT: II Atomic spectroscopy.** • Determination of spectroscopic energy levels or terms applying spectroscopic rules for various electronic configurations. This insight into detailed picture of electrons with in atom and understanding of couplings, repulsions and of splitting. • Postgraduate becomes able to describe and interpret elemental composition by its electronic spectra. **UNIT: III and IV Electronic Spectra–I and II** • Exploitation of effect of crystal environment on relative arrangement of electrons and to study the correlation and energy levels in weak and strong crystal fields. • Can describe various electronic configuration through special, electronic, graphical ,quantitative and qualitative diagrams.(TS and Orgel diagram) **UNIT: V Magneto chemistry.** • Students learn origin of magnetism, classification of magnetic materials on the basis of their magnetic properties. Validate the interrelation between magnetic field and atomic and molecular structures. • Understands the uses of magnetic materials in medical examination, diagnosis, treatment and therapy.
Course VI Organic Chemistry	**UNIT-I Aromatic electrophilic and nucleophilic substitution** • Students learn different organic reactions and mechanism such as Arenium Ion mechanism SNAr, SN1, benzyne and SRN1 mechanism, factors affecting these reactions and naming reactions of electrophilic and nucleophilic substitution. • Knowledge of various electrophilic and nucleophilic reactions exhibited by aromatic compounds.

	• Understanding the mechanism of defending reactions and applying them in search work and drug synthesis. **UNIT-II Common Organic Reactions and their Mechanism.** • Different laboratory and industrial route for the synthesis of various Complex organic compounds. • Integration of different organic reactions for designing and synthesizing new organic compounds. **UNIT-III Reagents in Organic Synthesis.** • Learning of Synthesis and applications of many organic reagents including organolithium compounds. • Synthesis of different reagents, their role in synthesizing the important classes of organic compounds like drugs dyes indicators and polymers. **UNIT-IV Elimination Reaction.** • Understand mechanism like E1, E2, E1CB and E2C mechanism, factors affecting these mechanism, pyrolitic elimination and different named reactions. • Applying the concepts to convert saturated organic compound into another unsaturated organic compounds by elimination of small molecules. • Study the effect of different stereochemistry of compounds on elimination of cyclic and acyclic Systems **UNIT-V Pericyclic Reactions.** • Develop knowledge of Molecular orbital symmetry, Pericyclic reactions and classifications. PMO approach, cyclic addition, 4n and 4n+2 systems. Different named reactions • Effect of modes of activations on the path followed and the outcome of reactions following cyclic pathways. • Understanding various pericyclic reactions occurring in the biological processes.
Course VII Physical Chemistry	**Unit 1& II** • Develop a competent knowledge of classical thermodynamic principles to predict the feasibility of reaction, understand the thermodynamics of colligative properties & the working of power plants, engine, cooler radiator, heater etc. • Able to characterize a discontinuous phase transition between two phases of matter. **Unit III** • Using concepts of distribution law& phase equilibrium students will be able to describe one or multi component system, salt hydrolysis, distribution indicator, nature of solute in solvents and also extraction of metal from its ores. **Unit IV** • Able to understand basic principle& electro kinetic phenomenon of non-equilibrium thermodynamics. Also able to analyze biological process such as proteins (folding /unfolding) and transports through membranes. **Unit V** • Able to understand various corrosion processes, protection methods and material selection& also able to take part in research programmes to solve specific corrosion problems.

Course VIII Chemistry of Life and Environmental Chemistry	• The course outcomes the understandings of biological molecules and processes. • Major part of the course is aimed to enhance the awareness about our protective and productive environment. • Students come to learn that how the toxic elements can be analysed and treated.
Course IX A Inorganic Chemistry –A **Course IX B** Organic Chemistry – B **Course IX-C** Physical Chemistry-C	• Becomes skilled in different kind of titrations mainly in redox and complexometric. • This course develops in postgraduates the understanding of classical analytical skills applicable in commercial analysis and complex mixtures analysis. Student learns different routes to synthesize some compounds by green synthetic methods **Qualitative Analysis and Organic synthesis.** • Able to Separate and identify the organic binary mixture. • Separation of mixture of unknown organic compounds and analyzing each organic compound by determining their aromatic nature, functional group, elements, saturation and unsaturation, melting point and derivative formation. • To synthesis complex organic compound like dyes, indicators and drugs in the laboratory and industries. **Physical Chemistry practical** • Students will be able to understand the intermolecular interactions of different organic and inorganic solvents using viscosity & surface tension measurements. • Able to solve the problems related to refractive index of different solvents. • Able to determine and understand various parameters using different measurements like conductivity, adsorption and thermochemistry. • Students will be able to analyze different colloidal systems.
	SEMESTER-III
Course X Inorganic Chemistry	**UNIT: I Metal complexes.** • Learns synthesis structure and bonding in metal-pi complexes like metal nitroysyl, carbonyls, phosphines, cyanides and isocyanides. • Understands synergistic bonding, stabilizing unusual oxidation state and acidity of ligands and validate the use of these metal complexes in industrial, catalysis and commercial scale. **UNIT: II Analytical chemistry.** • Learn about sources of errors, propagation of errors, detection and minimization of various types of errors in chemical analysis. • Understands various statistical models, accuracy, precision, average and standard deviation, variance, its analysis and confidence interval which is helpful in analytical methods development and validation. • Student learns tests of significance, criteria for the rejection of analytical data and the least-square analysis method and its importance in analytical calibration **UNIT: III Photoelectron spectroscopy** • Become introduced with PES in chemical and quantitative analysis. • Learn to describe the molecular energy levels of oxygen, nitrogen and of different oxidation states of different species. • Study applications of auger electron spectroscopy in industries to determine the surface structure, morphology of alloy and metallic materials.

	UNIT: IV Lanthanides and actinides. • Learn about general properties, synthetic routes of lanthanide and actinide in their aqueous solution andwill be able to understand the typical properties and nature of lanthanides and actinides. • Postgraduates will gain knowledge of applicationsof these inner transition series elements in nuclear medicine, energy production and in industries as the catalyst based on their magnetic properties. **UNIT: V Nuclear Chemistry.** • Postgraduates learn the different types of nuclear reactions and their importance in nuclear energy production and to synthesize new elements by artificial transmutation • They learn working of different nuclear reactors like thermal, fast breeder pressurized heavy water reactors. • Become able to understand different counting techniques and their applications in radio analysis.
Course XI Organic Chemistry	**UNIT-I Ultraviolet and Visible spectroscopy:** • Students able to understand the basic principle, Laws of absorption Fisher Woodward rule and applications. • One of the most prominent techniques employed in a research, medicinal Sciences and industries. • Determination of unsaturation, conjugation, homo and hetero annular systems and concentration determination of unknown samples. **UNIT-II Infrared Spectroscopy:** • Develop the knowledge of basic Principle, instrumentation and various factors affecting IR spectra. Application of IR and Raman spectroscopy • Applying the principle of IR and Raman spectroscopy for determination of various functional groups and identification of an organic compound. • It can be used as reliable technique for measurement quality control and dynamics measurement. • Demonstrating knowledge and understanding the role of IR and applying these in forensic labs for Civil and criminal analysis. **UNIT-III NMR Spectroscopy** • Able to know the chemical shift, coupling constant, INDOR and NOE, C^{13}, 2-D and 3-D NMR and applications. • Applying the knowledge of NMR spectroscopy for the structure determination and identification of organic compounds emphasizing on the carbon hydrogen framework and geometrical relationships between the interacting nuclei. • Effectively demonstrate the use of NMR principle in active areas like medical, food, and polymer, analytical and pharmaceutical industries. **UNIT-IV Mass Spectroscopy** • Understand the basic Introduction, ion production, factors affecting fragmentation, instrumentation, naming reactions, TOF MALDI and applications. • Demonstrating the knowledge of mass spectroscopy in research areas and industries for the determination of Molecular weights and presence of different isotopic atoms in organic compound. • Applying the knowledge of mass spectrum which represents a powerful technique with a myriad of different applications not only in biology, chemistry and physics but also in clinical medicine, defense and even space exploration.

	UNIT-V Photochemistry • Get the knowledge of basic principles, photo oxidation, photochemistry of aromatic compounds, Norrish Type I and II. Photo reduction and Photo fries rearrangement. • Understanding various photo physical and photochemical phenomenon as screen in biological and natural processes like photosynthesis. • Demonstrating knowledge of photochemistry in modern printing Technology photography and polymerization reactions initiated by light. • .
Course XII Physical Chemistry	**Unit I Unit II** • Able to execute probability principles to the behavior of large ensembles of atoms or molecules and to predict thermodynamic properties of a system &understand adsorption properties of polypeptides in reversed- phase HPLC. **Unit III &Unit IV** • Students have a thorough understanding of the postulates of quantum mechanics and will be proficient with the conceptual tools required to use those postulates. • Students will be able to explain the solution of Schrodinger equation & able to reveal the individual behavior of sub atomic particle to understand how world work at small scale. **Unit V** • Able to describe and explain different photo physical processes and their kinetics. • Able to describe the interaction of excited states with their surroundings and analyze photo induced electron transfer and excitation energy transfer with quantitative models.
Course XIII -A Inorganic Chemistry-A	**UNIT: I Photo inorganic chemistry.** • Understands Basic photochemical and photo physical processes and the governing rules to apply the photo energy in practical chemical reactions. • Learns about solar energy concentration and its utilization in alternate energy source. • Study photo catalytic use of transition metal complexes in industrial and medical fields. **UNIT: II Inorganic reaction mechanisms.** • Gain detail knowledge of different types of reactions and their mechanism. • Learn about the electron transfer theory and its application in inorganic metal complex. **UNIT: III Polymeric inorganic compounds.** • Bring one to be able how to synthesize a desired and modify a polymer for domestic and commercial uses likely in house hold materials, medicinal implants, artificial organs and overheating devices etc. • Understanding of immense use of these polymers as defense materials like bullet proof jackets etc. and making electrically active polymeric material. **UNIT: IV Stability constants of coordination compounds.** • Learn about stability constants, factors affecting stability of complex compounds, determination of stability constants by spectrophotometric, polarographic and kinetic methods. • Enable to explain the thermodynamic and kinetic stability of complexes.

OR **Course XIII –B** Organic Chemistry – B	**UNIT: V Electronic spectra -III** • Study the electronic spectra cubic environments, explanation of the selection rules behind the electronic spectra. • Can evaluate and describe of 10 dq, B value, nepleuxtic series and spectrochemical series. • Charge transfer spectra and application to the complexes enable to describe some unusual electronic properties of some complexes dyes, organic dyes and simple inorganic substances. **<u>Bio-Organic Chemistry Special Theory - I</u>** **UNIT-I Carbohydrates** • Study the Chemistry of Carbohydrates, structure, chemical reaction, disaccharides, polysaccharides and metabolism. • Using the knowledge of Carbohydrates for a healthy society by knowing their food sources and biological importance. • Understanding the role and Chemistry of Carbohydrates and applying the same in different areas Industries like energy supplements, alcoholic beverages, bioengineering, synthesis and medicine. **UNIT-II Amino acids** • To understand the methods of peptide synthesis sequence determination chemistry of insulin, oxytocin, purine, purines and nucleic acids with synthesis. • Demonstrating the knowledge of the structure and functions of proteins in various fields of Biology, health science nutrition, nursing, biotechnology and Pharmaceutical Sciences. • Understanding the role of insulin in glucose metabolism and working in various research departments and pharmaceutical industries for the treatment of diabetes. **UNIT-III Vitamins:** • Students able to understand the detailed chemistry of different vitamins including their biological importance. • Going through the course, students can understand the importance of vitamins in balanced diet which will help in creating a healthy society. • Most vitamins being coenzymes play an important role for enzyme activity, extending the ideas a new domain can be added in the research areas like drugs, energy supplements and nutrition. **UNIT-IV Enzymes:** • Students learn the Properties of enzymes, mechanism of enzyme action, chemical and biological catalysis, important enzymes, enzymes kinetics and enzyme inhibition. • The right perception will enable the students to have better understanding of human physiology. • Role and mechanism followed by the biocatalysts imbibes idea for invention of new drugs the better understanding of disease and hands drug formulations. **UNIT-V Coenzymes.** • Study of different Cofactors, prosthetic groups, apoenzyme, structure and biological function of different coenzymes with their mechanism of reaction. • Coenzyme studies being related to that of vitamins and enzymes as discussed

	earlier, helps in inculcation of better vision about human physiology, biological processes, nutrition value, research in nutrition and medicinal science. **<u>Physical Chemistry Special Theory</u>** **UNIT – I and II** **Adsorption** In this chapter we discuss the concept of ideal, non – ideal adsorption and catalysis. Single – layer adsorption – Langmuir adsorption isotherm, Multilayer adsorption – B.E.T. theory and its kinetic derivation and their applications. Unit second includes adsorption at solid – liquid interface column chromatography and its theory for one solute and several solutes. **UNIT – III** In this unit we study Solution and Interfacial Behaviour of Surfactants, then some properties of surfactants, micelle formation and their thermodynamics **UNIT – IV** **Electrochemistry** In this unit we study the Quantitative treatment of Debye - Hückel and Debye-Hückel-Onsagar (D-H-O) theory of conductance and Bjerrum and Fuoss treatments. **UNIT – V** **Nanometerials** In this unit we discuss an overview of applied chemistry of nanometerials, their Synthesis and characterization.
OR **Course XIII–C** Physical Chemistry-C	
Course XIV –A Inorganic Chemistry-A **Course XIV–B** Organic Chemistry -	**Inorganic Chemistry Practical** • Students will become able to synthesize and purify inorganic complexes of cobalt, copper, nickel and aluminum. • Postgraduate students know the characterization and analysis methods of complex compounds by qualitative and quantitative methods. **Organic Chemistry Practical** • Students are able to understand the process of Determination and Estimation of different functionality in organic compounds. • Determination of iodine and saponification values of an oil sample and DO, COD and BOD of water sample.

B **Course XIV-C** Physical Chemistry-C	• Study the Multistep Synthesis of various organic compounds. • This lab course provides knowledge about presence of different functionality in organic compounds and determination of number and percentage of functional groups in organic compounds by various methods. • Students have opportunity to do a multistep synthesis starting with simple compounds to make complex compounds which are used in various pharmaceutical industries and making many chemical weapons. **Physical Chemistry Practical** • Able to understand the fundamental importance of solubility in a large number of scientific disciplines and practical applications. • Partition coefficient measurements help students to understand their use in pharmacology, in environmental science and in metallurgy (determine distribution of impurities between molten and solidified metals). • Using conductometric titrations able to measure the process of chemical reactions, to check water pollution and alkalinity in H_2O and tracing microorganism in food microbiology. • .Knowledge of phase diagram helps in the study of metallurgy, ceramics and provides valuable information about melting, casting, and another phenomenon. • By learning colorimetric techniques students will be able to determine the unknown concentration of chemical elements and protein content of commercial food. • Able to calculate the rate constant and order of the reaction involved in acid and alkaline hydrolysis. And understand the use of saponification reaction for the production of soap and glycerin, fire extinguishers.
	SEMESTER-IV
PART-A	**A- Specialization: Inorganic Chemistry**
Course-XV-A Advanced Organometallics (Special Paper II)	**UNIT: I Advanced Organometallics** • Learn about organometallic compound of transition elements, their classification, synthetic routes, bonding and structural aspects make able to know typical bonding in metallocene and fluxional organometallic compounds. **UNIT: II Homogeneous Transition metal complexes.** • General discussion of catalytic behavior of transition metals, the factors involved the basic catalytic processes. • Understands the catalytic behavior and their use in industrial and other chemical processes. • Selective preference of particular catalyst, particular process based on its homogeneous and heterogeneous nature. **UNIT: III Some important Homogeneous catalysis Processes.** • Students will be able to explain application of catalysis in commercial industrial medicinal synthetic routes and catalytic remediation and treatment of environmental pollutants. **UNIT: IV Metal – Metal bonding carbonyl and halide clusters.** • Learn about new branch of chemistry i.e. chemistry of metal clusters. • Gain knowledge of Polyhedral model of metal clusters, structure of metal carbonyls, clusters in three four, five and six vertices of transition metals. • Rhenium III based halide derivatives cluster involving the scrambling in bridge and terminal carbonyl • Become able to calculate number of metal metal bonds in given metal cluster;

	understand scrambling of carbonyl group which explains the fluxional behavior of metal carbonyls. **UNIT:V Transition metal carbon multiple bonded compounds**. • How metal carbon multiple bonding is helpful in preparation, structure, bonding, reactivity of metal carbene and carbyne complexes. • Their application in biological, industrial, medicinal and environmental synthesis and analysis.
Course XVI - A Modern Techniques of Chemical Analysis (Special Paper III)	**Modern Techniques of Chemical Analysis** The course is designed to learn the basic principles used in the instruments. Postgraduates become able to use modern instruments in the analysis. They are trained theoretically in five kinds of techniques and instrumentation viz. photometric, spectral, electro analytical, chromatographic and thermo analytical. **UNIT-I :Spectrophotometry** • Photometry laws and application in Chemical analysis. • Colorimetric and spectrophotometric principle, theory and instrumentation. • Different types of spectrophotometric techniques of analysis. • Spectrophotometric titrations theory, principle and applications. • Flourescence spectroscopic technique, its detailed explanations to chemical analysis. **UNIT-II : Atomic Spectroscopy** • Students become learned about atomic spectroscopic techniques of analysis. • Flame photometry principle and theory of working. • The atomic absorption spectroscopy instrumentation and its applications to trace analysis. • A short explanation to atomic emission spectroscopy with special emphasis on inductively coupled plasma-atomic emission spectroscopy. • Learning of all above techniques and interferences in their applications to analysis. **UNIT-III :Chromatographic methods:** • Learns about basic principle of chromatographic methods and behavior of solutes, column efficiency and resolution. • Instrumentation & applications of chromatography. • Comparison of Gas chromatography (GC) and High-Performance Liquid Chromatography (HPLC). **UNIT-IV : Polarographic Methods** • Students become aware about electro analytical techniques. • Polarography terminology, basic principle and factors effecting diffusion current • Polarographic analysis methodology and instrumentation. • Various kinds of currents and their significance involved in polarography. • Applications of polarography to inorganic and inorganic analysis. **UNIT-V: Thermo analytical methods:** • Instrumentation and factors affecting thermo gravimetric technique. • Applications to inorganic compounds, analysis of clays and soils and non-stoichiometric compounds. • Instrumentation and factors affecting Differential Thermal Analysis technique. • Applications to inorganic compounds analysis.
Course XVII -A Inorganic Spectroscopy	**Inorganic Spectroscopy** **UNIT: I IR Spectroscopy** • Enable students to explain interaction at molecular level between IR radiations and matter.

(Special Paper IV)	• Understanding of different types of molecular vibrations and their role in structural elucidation viz. functional group, mode of bonding and shapes of molecules. • Appreciate the role of technique in industry as well as research for the quality control and dynamic measurements in quantitative and qualitative analysis. **UNIT:II NMR Spectroscopy** • Students will be able to explain NMR phenomenon. • Application of this technique to study physical, chemical and biological properties of molecule. • Students will get thorough knowledge and importance of magnetic resonance for medical diagnosis and in industries. **UNIT: III NQR Spectroscopy** • Understanding of study of a technique for study of non spherical (prolate and oblate shape) nuclei. • Students will be able to understand percentage of ionic and covalent character in bond. • Thorough knowledge of Electric field gradient in Relationship to molecular structures. • Importance of spectroscopy for the nuclear study of substances that cannot be studied with NMR and other techniques, drug design and physical and chemical characterization of pharmaceutical products. **UNIT: IV Mossbauer spectroscopy** • Understanding of **Mossbauer effect**. • Instrumentation and applications to structure determination and elucidation. • Enable to understand it as an effective tool to study Mossbauer active nuclei, structure and bonding of complexes. • Understanding the activity of Fe catalysts through phase transformation • As an geological tool it is used for identifying the composition of iron containing specimens including meteors and moon rocks, iron rich rocks on mars **UNIT:V ESR Spectroscopy** • Students will know about Electron spin and its role in molecular structure elucidation • Understanding of different relaxation phenomenon, line width, Zero field splitting, Kramers degeneracy and their role in ESR structure interpretation.
Course XVIII-A Bio -Inorganic & Superamolecular Chemistry (Special Paper V)	**UNIT: I Metalloporphynes and metallo enzymes.** • To study porphyrins and their salient features. • To understand the structure of haemoglobin, myglobin chlorophyll and siderophores and enzymes and their biological applications • Transport of iron in microorganisms, study apoenzymes co enzymes metalloenzymes structure and functions of carboxypeptidase enzyme and carbonic anhydride. **UNIT: II Oxygen carrers.** • Understands transportation of oxygen and carbondixode in human body and microorganisms. • Come to synthesize or use artificial oxygen careers for oxygen transport. **UNIT: III Transport and storage of metals.**

	• Get enlightened with different transport mechanism in physiological processes and their role in sustaining life **UNIT: IV Inorganic compounds as therapeutic agents introduction of chelation therapy.** • Students will be able to correlate different biological and inorganic processes by studying the importance of Inorganic compounds as potential replacement of the typical organic drugs for prevention and treatment of diseases. **UNIT: V Nitrogen Fixation.** • To describe natural and artificial nitrogen fixation based on reactivity of coordinated dinitrogen and nitrogen metabolism in different forms • Potential of nitrogen to be used in synthesis of nitrogenous compound shaving biological and industrial use. • Artificial fixation of nitrogen can be a resolve for the future demand of agrochemicals and a way to meet out the food requirements for the increased population.
PART-B	**B- Specialization: Organic**
Course XV-B Synthetic Strategy (Special paper II)	The course is designed to learn the basic reactions and their mechanisms, reagents and rearrangement to understand Organic Chemistry. **UNIT-I Organic reagents** • Study of Reagents in organic synthesis, Wilkinson catalyst, Lithium dialkyl cuprates, LDA, DCC, Baker yeast, DDQ • Organic reagents demonstrate the significance of chemistry of specific, selective and sensitive reactions. • The knowledge of chemical processes catalyzed by organic reagents is used in chemical industry to transform various compounds into more specialized products. **UNIT-II Oxidation** • Students are able to understand the process of oxidation of alcohols, ozonolysis, oxidative cleavage, aromatization of six member ring. • Oxidation reactions are used to produce chemicals that are used in various syntheses. • Understanding various natural processes like formation of rust on metal surface, burning of fuels, digestion of food, etc. **UNIT-III Reduction** • To learn different reductive processes, reduction of nitro compounds, reductive coupling, acyloin ester condensation, cannizzaro reaction. • Understanding redox reactions like photosynthesis, combustion and corrosion, etc. • Reduction provides knowledge about various processes occur in daily life like combustion of batteries, methane gas stove, reduction of hydrogen peroxide to water in bleaching of clothes. **UNIT-IV Rearrangements** • To understand rearrangement reactions like benzil-benzilic acid, Favorskii, Arndt-Eistert synthesis, Bayer villiger oxidation, Hoffmann and curtius rearrangement • Rearrangement reactions provide knowledge about conversion of a molecule into another via intramolecular shifts • Arndt-Eistert synthesis was found to be very useful to extend the carbon chain in organic molecules. Therefore it helps to prepare large molecules from smaller one.

	UNIT-V Disconnection approach • Students get the knowledge of synthons and synthetic equivalents, disconnection approach functional group interconversion, one and two group C- X disconnection, chemoselectivity, reversal of polarity etc • Disconnection approach give knowledge about retrosynthetic pathway in which molecules to be synthesized, first break it down by series of disconnection into possible starting materials and then start the reverse synthesis to again synthesized target molecule. This is helpful to synthesise complex organic molecules in laboratory which are extracted from nature.
Course XVI- B Natural Products (Special paper III)	**NATURAL PRODUCTS** In this course students will be able to understand the chemistry of natural products obtained from plants and animals, their biosynthesis and applications in medicines. **UNIT-I Terpenoids** • Students understand the process of isolation, general methods of structure determination and biosynthesis of different examples. • Understanding the vital role of terpenoids in exerting metabolic control and in mediating intra and inter species interaction like pollination and defence in plants • Applying the mechanism of biosynthesis of terpenoids to synthesize many other artificial organic compounds. **UNIT-II Carotenoids and Xanthophylls** • Able to understand the Classification, isolation, general methods of structural determination and biosynthesis of different examples. • Application of carotinoids to protect all against photooxidative damage. • Understanding the mechanism of synthesis, chemical reactions and biological functions of different carotinoids **UNIT-III Alkaloids** • Learn the methods of isolation, general methods of structural determination and biosynthesis of different examples. • Study of biosynthesis of various alkaloids help the students to understand mechanism in biological system • Extending the basic concepts of nitrogen containing basic natural organic compounds their pharmacological effect and uses in medications as recreational drugs. **UNIT-IV Steroids:** • Able to explain Basic skeleton, stereochemistry, structural determination, synthesis and biosynthesis of many examples. • The knowledge of important steroids like cholesterol , sex hormones, their chemical and biological properties and applications in analytical and medical Sciences **UNIT-V Plant pigment** • Able to know the nomenclature, isolation, general method of structural determination, synthesis and biosynthesis of Anthocyanins, polyphenols and quinines. • Developing techniques for isolation and identification of bio compounds from natural products. • Exploring the basic chemical nature of biochromes and their applications of natural

	food colours and food products for more benefits.
Course XVII-B Medicinal Chemistry (Special paper IV)	**UNIT-I Drug design** • Students will be able to obtain the knowledge of Design and Development of new drugs, structure -activity relationship, factors affecting bioactivity, free Wilson analysis, Hansch analysis and their relationship. • The course represents one of the most important applicative parts of organic chemistry. Knowing the methods of drug designing, drug modifications, structure modifications etc., students can actively contribute in areas like pharmaceutical research, new drug designing for different diseases having maximum therapeutic values and least side effects. **UNIT-II Pharmacokinetics and Pharmacodynamic** • Students grasp the knowledge of medicinal chemistry, different pharmacokinetic parameters, treatment of enzyme stimulation, inhibition and initiator formation, Significance of drug metabolism in medicinal chemistry. • By the deep understanding of the pharmacokinetics parameters of a drug, modifications can be made for making new drugs having excellent therapeutic values. Similarly the pharmacodynamic parameters make them capable of better understanding of drug mechanism and thus modifying the drugs to have least side effects. **UNIT-III Antibiotics and anti-infective Drug** • Able to understand the structure, SAR and biological action of antibiotics. Mechanism of bacterial resistance and sulphonamides. • By understanding the structural activity relationship and make of action of antibacterial drugs many bacterial diseases can be reduced. **UNIT-IV Psychoactive drugs** • Students understand the concept of neurotransmitters, CNS depressants and stimulants, SAR and mode of action on CNS, general anesthetics, sedative, hypnotics and psychotropic drugs. • This course provides knowledge of psychoactive drugs which help to understand the stimulant and depressant effect of brain which affect the behavior of Human being. **UNIT-V Therapeutic Agents, SAR and their mode of action** • Study different categories of drugs like Antineoplastic agents, cancer chemotherapy, cardiovascular drugs, antihistamine agents antifertility agents and diuretics • Knowledge of mode of action, type of drugs used to cure the disease, amount taken and side effects of drugs on body are important to understand physiology of human body • By understanding the major biological issues in the society like cancer, heart failure, kidney failure and uncontrolled population, drugs like antineoplastic agents, cardiovascular drugs, diuretic and antifertility agents has great role to resolve these problems.
Course XVIII- B Polymer Chemistry (Special paper V)	**UNIT-I Chemistry of Polymerization:** • Students able to understand Macromolecular concept, different types of polymerization, concept of copolymerization. • The course efficiently introduces different techniques and mechanisms for polymerization, effect of polymeric composition on properties and hence applications. The well equipped students can exploit the knowledge in the ever

	growing polymer industry. **UNIT-II Polymer Synthesis and Characterization** • This course described the different techniques of polymer synthesis, different methods of characterization of polymer, Measurements of molecular weight. • The course gives information about different technique of polymer synthesis, its characterization and practical significance of molecular weight. **UNIT-III Stereoisomerism in polymers and Morphology and order in crystalline polymers** • Study the types of stereoisomerism in polymers, Cellulose and amylose, Configuration of Polymer chains, Crystallization and melting etc • Applying the knowledge of stereoisomerism effects on properties, crystallization, Tm, Tg, physical properties, polymer utilization and property requirement, etc., new materials having broad applications can be designed. **UNIT-IV Polymer Reactions** • Students are able to understand polymer reactions, Graft copolymerization, polymer as carrier support. • Study of general polymeric reactions, vulcanization, cross linking and graft- co polymerizations • Introduction of different functional on main polymeric chain increase applicability of polymer and these graft co polymer used in various field as catalyst and Drug carrier. **UNIT-V Commercial and Specialty Polymers** • Able to know different types of polymers and their applications, Fundamentals of Supramolecular Chemistry of polymers. • Knowledge of polymers encountered in everyday life, their synthesis and various applications.
PART-C	**Course-XV C** **(Physical Chemistry Special Theory-II)** **(Quantum Chemistry** **UNIT – I and – II** In this unit we study time-independent perturbation theory for non-degenerate states, application to particle in one-dimensional box, ground state helium atom and Stark effects. Further, in second unit we study variation theory for ground and excited state energy and their applications and an over view of Hellmann-Feynman theorem. **UNIT – III** This unit includes Many -Electron Atoms: Concept of spin and Pauli exclusion principle. Slater determinants. Hartree Self Consistent –Field Method and Hartree – Fock Self Consistent –Field Method and finally the concept of Koopman's theorm. **UNIT – IV** In this unit we study The Born-Oppenheimer Approximation, The linear combination of atomic orbital (LCAO)-approximation and **UNIT – V** includes Huckel Molecular Orbital Theory of conjugated Π- electron Systems and applications

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Course XVI-C	**(COURSE –XVI C)** **(PHYSICAL CHEMISTRY SPECIAL THEORY - III)** **(SOLID STATE CHEMISTRY)** **UNIT – I** **X-ray Diffraction & Crystal Structure** In this unit we study, The Laue equations and Bragg's law and X-ray diffraction experiments includes powder method, single crystal method and about Reciprocal lattice. **UNIT – II** This unit includes Bonding in crystals, Band theory. Schottky and Frankel defects and Free electro theory (a qualitative treatment) Zone theory and an important Brillioun zones, k – space. **UNIT – III** This chapter covers the Electrical properties of metals, conductors and non – conductors, Hall effect. Thermal properties Optical properties and Dielectric properties **UNIT – IV** **Superconductivity** In this unit we study Meissner effect and Thermodynamic effects of superconducting species and finally discuss BCS theory of superconductivity. **UNIT – V** In the last unit we understand Solid State Reactions and their General principles, experimental procedures, kinetics of solid state reactions, also discuss vapour phase transport methods, interaction or ion exchange reaction, electrochemical reduction methods, preparation of thin films, growth of single crystal.
Course XVII – C	**(COURSE –XVII C)** **(PHYSICAL CHEMISTRY SPECIAL THEORY - IV)** **(BIOPHYSICAL CHEMISTRY)** **UNIT – I** **Cell membrane and its structure** In this unit we study, The Cell Membrane, lipids in biological membranes, phospholipids, sphingolipids,glycolipids, cholesterol, gangliosides, lipoproteins, types and arrangements of proteins in membranes. Further an over view of Danielli and

	Davson model, Fluid Mosaic Model and finally hydrolysis of ATP and its synthesis from ADP. **UNIT – II** This unit includes Statistical mechanics in biopolymers chain configuration of macromolecules, Polypeptide and protein structures and protein folding neurons, synapse, neurotransmitters. **UNIT – III** This chapter covers Transport through cell membrane, active and passive transport and Donnan effect in Osmosis, its dependence on pH difference across the membrane and Bio-mechanics. **UNIT – IV** **Biomolecular Interactions** In this unit we understand some Interactions between biomolecules the Scatchard plot and forces involved in the stability of proteins. **UNIT – V** In the last unit we can understand Protein sequence and structure α-helix, β-strand, β-sheet, turns and loops, quaternary structure, globular and fibrous proteins. Finally an important Protein folding and refolding, Protein misfolding, Chaperones and Brain diseases. .
Course XVIII–C	In this unit we study, classification and importance of Macromolecules, condensation and addition reactions and Polymer solutions, criteria for polymer solubility, conformations of dissolved polymer chains. **UNIT – II** This unit includes Thermodynamics of polymer solutions, ideal solutions, regular Flory – Huggins Theory and Flory – Krigbaum theory for dilute polymer solutions. Also includes Structure determination techniques: X-ray crystallography, NMR, Microscopy: TEM, SEM, STEM, AFM for macromolecules **UNIT – III** This chapter covers statistical thermodynamics of interpenetrating random coiling polymers in solution with application to phase separations, swelling of networks, depression of melting point. Then some techniques like osmometry, light scattering, neutron scattering intrinsic viscosity, size exclusion chromatography, sedimentation for the dertermination of average no. and average mass of the macromolecules. **UNIT – IV** In this unit we understand Rheology and Mechanical Properties of Polymers and

	practical importance of their aggregation states, viscoelasticity and Applications of polymers **UNIT – V** In the last unit we can understand Mechanical strength and life time of polymer mechanism of polymer fracture, effect of various factors on the mechanical properties of polymers and Polyelectrolytes.
Course XVIII-C	**Unit I & II** • Able to classify polymers and understand different theories involve thermodynamics of polymer solution which have considerable practicals well as theoretical importance. • Able to apply different techniques for the determination of structure of polymers & use the knowledge for the designs of many processes and products. **Unit III** • Able to describe the static and dynamic methods to analyze size and mass of polymers. • Differentiate easily between rigid plastics and flexible plastics. • Able to do the network modeling of the influence of swelling on the transport behavior. **Unit IV** • Students will be able to describe rheological and mechanical properties of polymers and explain their use in the production of polymeric materials. **Unit V** • Able to understand the mechanical strength and life time of polymer and apply the knowledge of mechanical strength in fabrication and composite new polymers. • Able to explain the nature of polyelectrolytes which modify flow and stability properties of aqueous solution and gel used in varied industries.
Practical Course to Each Specialization	
Course XIX-A Inorganic Chemistry Practical OR	**Course XIX-A** **Inorganic Chemistry Practical** • The students are given the exposure to instrumental analysis in the following instrumentation techniques. • Electronic absorption spectroscopy (Spectrophotometry and titrations) • Atomic emission spectroscopy (Flame Photometry) • Electro analytical (conductometric, potentiometric, polarography cyclic voltammetry and pH metric.) • Students become skilled in handling the instruments and which they could apply in research and carriers in industries and other agencies. **Course XIX-B** Organic Chemistry Practicals

Course XIX-B Organic Chemistry Practical OR **Course XIX-C** Physical Chemistry Practical	**Extraction of organic compounds from natural sources, paper chromatography, spectroscopy and multistep synthesis.** Organic compound present in natural source are extracted by different methods and various compounds extracted like caffeine from tea, casein from milk, β- carotene from carrots and lycopene from tomatoes. • Identification and separation of organic compounds are done by paper chromatography and thin layer chromatography. • Natural products from plant extracts provide unlimited opportunities for new compounds. • Experimental work solves many problems and key challenges in the extraction, isolation and characterization of many unknown organic compounds. • The knowledge of multistep synthesis helps the students to make complex organic compound from readily available simple compound. • From the multistep synthesis of indigo, vacor and various compounds, students learn the mechanism and formation of these compounds which in colouring cloths and hairs and vacor used as rat killer etc. **OR** **Physical Chemistry Practicals**(Course XIX-C) • Become familiar with instrumental analysis techniques in chemistry. And become proficient in data analysis and interpretation. • Able to analyze the various intermolecular interactions in solution and molar mass of compounds by using viscosity & cryoscopy. • Able to understand solvent structural activity of solute, using Conductivity of different ionic solutions & able to measure different thermodynamics parameters. • Students will gain insight to analyze different solutions using potentiometry, Flame photometry & Colorimetry. • Able to understand optical activity behavior of different substances by Polarimeter measurements.
Course XX Seminar for all the three Specializations	Seminars are specially meant to assess the students for the development of all above outcomes and below listed specific outcomes.

COURSE - M.Sc. BOTANY

Course Code	Title of the course	Periods (60 m) Per week	Theory Exam	Practical Exam	IA (I+II)	Total Marks	Exam. Duration Hrs.)
	SEMESTER I						
MBOT-101	Biology And Diversity of Algae And Fungi	4	40		40	80	3
MBOT-101(P)		6	-	20		20	3
MBOT-102	Cell and Molecular Biology (Common Course)	4	40		40	80	3
MBOT-102(P)		6	-	20		20	3
MBOT-103	Biochemistry and Metabolism (Common Course)	4	40		40	80	3
MBOT-103(P)		6	-	20		20	3
MBOT-104	Tools and Techniques in Biological Sciences (Common Course)	4	40		40	80	3
MBOT-104(P)		6	-	20		20	3
Total						**400**	
	Semester-II						
MBOT-201	Biology and Diversity of Microbes and Plant Pathogens	4	40		40	80	3
MBOT-201(P)		6	-	20		20	3
MBOT-202	Ecology and Environment (Common Course)	4	40		40	80	3
MBOT-202(P)		6	-	20		20	3
MBOT-203	Cytogenetics and Evolution (Common Course)	4	40		40	80	3
MBOT-203(P)		6	-	20		20	3

MBOT-204	Biostatistics and Bioinformatics (Common Course)	4	40		40	80	3
MBOT-204(P)		6	-	20		20	3
Total						**400**	
	Semester-III						
MBOT-301	Biology and Diversity of Bryophytes and Pteridophytes	4	40		40	80	3
MBOT-301(P)		6	-	20		20	3
MBOT-302	Plant Physiology	4	40		40	80	3
MBOT-302(P)		6	-	20		20	3
MBOT-303/304/305 Any one	Biology anad Diversity of Gymnosperms OR Plant Biotechnology OR Plant Propagation Techniques	4	40		40	80	3
MBOT-303/304/305 (P) Any one		6	-	20		20	3
MBOT-306/307/308 Any one	Biology and Diversity of Angiosperms OR Tissue Culture and Horticulture OR Wood Sciences and Forest Biodiversity	4	40		40	80	3
MBOT-306/307/308 (P) Any one		6	-	20		20	3
Total						**400**	
	Semester -IV						
MBOT-401	Anatomy, Palynology and Reproductive biology of Angiosperms	4	40		40	80	3
MBOT-401(P)		6	-	20		20	3
MBOT-402	Plant Resource Utilization and breeding	4	40		40	80	3
MBOT-402(P)		6	-	20		20	3

MBOT-403/404/405/406 Select one Specialization with 2 courses of Theory and practical each -	403 - i. Advances in Mycology and Plant Pathology ii. Advances in Applied Microbiology 404- i. Ethnobotany and Biodiversity conservation ii. Ethnobotany , Bio-prospecting and traditional knowledge 405- i. Advances in Plant Physiology and biochemistry – I ii. Advances in Plant Physiology and biochemistry – II 406- i. Phytochemistry and Palynology of Plant kingdom – I ii. Phytochemistry and Palynology of Plant kingdom – II	4+4	40+40		40+40	80+80	3+3
MBOT-403/404/405/406 (P)		6+6		20+20		20+20	3+3
Total						400	
MBOT-407	**PROJECT** (Assigned in 3rd semester and goes until 4th semester)					50	
Grand Total of Marks For the Course						1650	

Title of the course	
MBOT-I01 Biology And Diversity of Algae And Fungi	• Habitats, Thallus organisation, ultra cell structure, reproduction, pattern of life cycle and economic importance of algae. • Algal plastids, blooms and biofertilizers. • Lichens and their economic importance. • Introduction and classification of mycology • Comparative study of (Dictyosteliomycota, Myxomycota, Chytridiomycota, oomycota, Zygomycota, Ascomycota). • General account of Powdery mildews, discomycetes, Basidiomycota. • Modes of Nutrition and sex hormones in Fungi. • Importance of Fungi • Basic consepts of algae, algal plastids, Blooms and Biofertilizers and lichens. • Basic Mycology, comparative study,Modes of Nutrition and Importance of Fungi

MBOT-102 Cell and Molecular Biology (Common Course)	To develop the understanding of • Difference between the plant cell and animal cell. • Structure and functions of the plasma membrane, cell wall and various cell organelles. • Transportation across the cell membrane. • DNA, chromatin, chromosomes, cell division and programmed cell death. • Different levels of gene expression and their regulation • Transport and distribution of protein among cell organelles in the cell. • Students were able to identify different cell organelles in the electron micrographs and various mitotic and meiotic stagesof cell division. They could differentiate between euchromatin and heterochromatin.
MBOT-103 Biochemistry and Metabolism (Common Course)	Students should develop the understanding of: • Concept of pH, buffers and free energy etc. • Law of thermodynamics. • Preparation of solutions of different concentrations and molarities. • Carbohydrates, lipids, amino acids, proteibns and nucleic acids in detail. • Nitrogen fixation and role of microbes in it. • Secondary metabolites. • Students were able to prepare the solutions of different concentrations and could identify the carbohydrates, lipids, proteins and amino acids in the test sample
MBOT-104 Tools and Techniques in Biological Sciences (Common Course)	**Course objectives:** • Develop scientific –technical expertise, culture and work habits • Familiarize with the basic tools and techniques of scientific study and emphasis on biological sciences. • Develop basic understanding of the equipment's usage. **Course outcome:** Student will be able to • Demonstrate a general understanding of the standard laboratory tools, methodology, and process of biological research and basic scientific writing. • Design and conduct independent laboratory or field research that is consistent with the highest standard and practices of research in the relevant biological sub-discipline.

MBOT-201 Biology and Diversity of Microbes and Plant Pathogens	• Plant pathogens and their history, Classification and sympomology • Various aspects associated with the disease development of physical, physiological and molecular (gene) level • Their transmission and spread • Management and control of various disease cycle • Different diseases and their disease cycle • Consepts of Microbiology and classification of different groups of microbes • Structure of bacteria, virus, Nutrition, reproduction and mechanism of their antiaction • Cancer an its development • Immunology, concept, development and conrol • Structure and examples of various viruses, Microbes and their application (both Practical and economical) • The Students must be able to recognize disease on plants and their sympo3tomology and cylce and how to controlle these diseases, must be differentiate various pathogens/microbes and their practical usefulness and harm on both human and plants (Agriculture).
MBOT-202 Ecology and Environment (Common Course)	Students should know about • Climate, soil and vegetation patterns • Ecosystem, communities, populations, species, biomes and succession • Population dynamics: factors that affect its size and distribution, growth curves-J and S curve, carrying capacity, habitat and niche • Species interactions : intraspecific and interspecific interactions, predation, competition, mutualism,symbiosis,parasitism,commensalism • Energy flow in ecosystem • Terrestrial, aquatic and ocean ecosystem • Biological diversity role • Speciation and isolation • Environmental pollution • Ecological management and sustainable development • Tell about various positive and negative interactions in community • Understand the contemporary environmental issues including global change and life on earth • Understand various factors affecting ecosystem and energy flow • Explore the ideas of ecological management and sustainable development

MBOT-203 Cytogenetics and Evolution (Common Course)	Students should know about • Mendelian inheritance and its modifications • Application of Mendel's law • Chromosome: organization and variation • Gene expression and its experimental aspects • Quantitative genetics • Population genetics • evolution : species concept and speciation • Molecular evolution The students were able to know about the basic concepts of genetics and applied aspects of genetics
MBOT-204 Biostatistics and Bioinformatics (Common Course)	Bioinformatics is a multidisciplinary field that combines biology, computer science, and statistics to analyse and interpret biological data. The primary objectives of bioinformatics are as follows: 1. Data Management: One of the key objectives of bioinformatics is to develop efficient methods for storing, organizing, and retrieving biological data, such as DNA sequences, protein structures, and gene expression profiles. 2. Sequence Analysis: Bioinformatics aims to analyze and compare DNA, RNA, and protein sequences to identify similarities, patterns, and functional elements. 3. Structural Bioinformatics: Bioinformatics plays a crucial role in predicting and analyzing the three-dimensional structures of biomolecules, such as proteins and RNA. 4. Functional Annotation: Bioinformatics tools and algorithms are used to assign functional annotations to genes and proteins. 5. Comparative Genomics: Bioinformatics facilitates the comparison of entire genomes across different species to uncover similarities, differences, and evolutionary relationships. 6. Drug Discovery and Development: Bioinformatics plays a significant role in drug discovery by facilitating the analysis of biological data to identify potential drug targets. **7.** Personalized Medicine: Bioinformatics enables the analysis of individual genomic and clinical data to tailor medical treatments based on an individual's genetic makeup. **Course Outcome:** A student completing a major in Bioinformatics shall be able to apply: • knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics • existing software effectively to extract information from large databases and to use this information in computer modeling • problem-solving skills, including the ability to develop new

	algorithms and analysis methods • an understanding of the intersection of life and information sciences, the core of shared concepts, language and skills the ability to speak the language of structure-function relationships, information theory, gene expression, and database queries
MBOT-301 Biology and Diversity of Bryophytes and Pteridophytes	• Genral characters of Bryophytes and pteridophytes. • Classification, Economic importance, Alternation of generation of Bryphytes and pteridophytes. • Origin of land plants withFossil evidences. • knowledge of Paleobotany and some basic principles and techniques • Genral account of Marchantiales, Jungermanniales,Anthocerotales, Sphagnales, Funariales and Polytrichales. • Salient features of Psilopsida, Lycopsida, Sphenopsida, Pterridopsida. • Stelar system, Apogamy and apospory, Heterospory, seed habit, Telome theory, Cytological evolution of Pteridophytes. • Distribution and ecology of Bryophytes and pteridophytes in H.P. The students were able to classify various divisions and classes of bryopheytes and Pteridophytes. Have knowledge about the liveworts, Mosses and ferns of Himachal Pradesh with their ecology and economic importance and various fossil land plants. • Migration of plants from water to land. • Familiar with morphological knowledge of bryophytes and pteridophytes.

MBOT-302 Plant Physiology	• Plant soil, water relationships by involving various processes • Physiology of stomata • Phyochemistry, photosynthesis, respiration and various cycles (pathways) associated with these prosses • Nitrogen and sulphure fixation/assimilation • Photomorphogenesis; their signalling, localization and expression • Hormonal Physiology and their roles • Flowering prosses and related aspects of its regulation at gene and molecular level • Able to differentiated between photosyntesisie ie. Energy generation and respiration (their break down) and other processes like opening and closing of stomata, flowering, photomorphogensis. • They must be able to explain the roles of various hormones on above said processes
MBOT-303/304/305 Any one	**Biology anad Diversity of Gymnosperms-** • Students should be able to differentiate between flowering and non-flowering plants, naked and covered seeded plants, • different types of fossils and the process of fossilization, fossil related to Gymnosperms, various techniques & principles related to fossilization, • various morphological and anatomical features of different classes of Gymnosperms, economical and ecological importance of gymnosperms, • various types of timbers and products yielded from Gymnosperms and evolutions of various types of woods, distributions of Gymnosperms in Himachal Pradesh OR **Plant Biotechnology-** **Objective:** • This course aims to help the students to gain an advanced level of understanding in the comprehensive components of plant biotechnology. • The content of the course contributes for food security and human health towards sustainable agriculture. • On top of technical insights into plant breeding, tissue culture, plant genes and genetic modification (GM), will have the overview of GM crops in the market and pipeline for their various applications like improved food quality and medicine. • They will also gain a good knowledge on global regulation framework on GM crops and product as well as intellectual property rights related to plant biotechnology. • The course will also help student careers in plant related research. **Outcomes:** • To understand how biotechnology has been used to develop

	knowledge of complex processes that occur in the plant • To use basic biotechnological techniques to explore molecular biology of plants • To understand the processes involved in the planning, conduct and execution of plant biotechnology experiments • To explain how biotechnology is used for plant improvement and discuss the ethical implications of that use • To communicate effectively using oral and written means for both scientific and non-technical audiences. OR **Plant Propagation Techniques-**
MBOT-306/307/308 Any one	**Biology and Diversity of Angiosperms-** • Phenetics and phylogenetic system of classification • History, principal, rules of ICBN • Naming of hybrids and cultivars • Species concept • numerical taxonomy, cluster analysis and cladistics • Herbarium and Botanical gardens of India and world • Phytogeography of India • Local Plant diversity and socio-economic importance • Invasion and introduction with particular reference to India. • Plant biodiversity extinction and their conservation • At the end of semester, student will be able to understand the species concept of angiosperms with special reference to morphology and taxonomy • Able to identify the primitive and advanced characters of the flowering plants • Understand the importance and methods of conservation of plant resources. OR **Wood Sciences and Forest Biodiversity-** Students should know about • Megabiodiversity status and hot spots of world • various biodiversity of India • Endangered and endemic flora of india • IUCN categories of plant • wasteland management in Himalayan region • Red data book and strategies for conservation of biodiversity • Medicinal plants, their global importance and economic aspects of exploitation of medicinal plants • Traditional botanical knowledge and techniques in ethnobotany • Role of biotechnology in the conservation of biodiversity Sustainable utilization of plant resources • endangered and endemic species of their region • sustainable utilization of overexploited plants

	and conservation strategies OR **Tissue Culture and Horticulture-**
MBOT-401 Anatomy, Palynology and Reproductive biology of Angiosperms	Students should know about • Meristem : types, histochemistry and organization • Angiosperms : secondary growth, male and female gametophyte and embryo sac • Cytological, biochemical and molecular aspects of incompatibilities in angiosperms • Endosperms and their types • Basic techniques to study pollen, pollen viability, their storage and allergic reaction caused by them • Tissue culture : methods, fundamental and applied aspects • The students were able to – 1. Learn about reproductive organs and embryo sacs of flowering plants 2. Describe various anomalous structures in angiospermic wood. Describe pollen and their viabilities
MBOT-402 Plant Resource Utilization and breeding	Students should know about • Wood : Structure ,properties and types ; cork and its uses • General account of bamboo species in India and its properties and uses • Economic plants yielding essential oils ,tannins, dyes, • Resins, gum and aromatic substances • Ornamental plants and fruits and nuts of Himachal Pradesh • Bioenergy and petroleum plants • Underexploited and underutilized plants • General account of psychoactive drugs and poison from plants of India • Vavilov centre of origin of cultivated plants • Plant introduction and acclimatization • General account of depression, heterosis, composites and synthetics • The students were able to identify – • identify different woods and their structure identify various economic and ornamental plants of their region
MBOT-403/404/405 /406 Select one Specialization with 2 courses of Theory and practical each	403 - **i. Advances in Mycology and Plant Pathology-** • 10 Various Pathogenic agents and injuries caused by them • Diseases in roots and factors associated with them • Mechanisms of various disease induction and prevention measures • Management and treatment of various diseases. • Students must be able to differentiate and categorized various disease caused agents, their disease cycle and their treatment by adopting suitable measures. Moreover Students must be able to know how to eradicate such diseases from plant by using various therapeutic techniques which have • less harmful effects on soil and environment. ii. **Advances in Applied Microbiology**-

Objective:

To give an introduction about the microbial world- their distribution- morphology growth and about the role of microorganism in various fields of life sciences and Industry.

• Makes the student aware of the role of microbes in the daily life as well as in the various fields of science and how it can be controlled is also dealt with.

Course outcome:

- Students will learn about the different fields in microbiology.
- Students will gain knowledge about the different types of microorganism

404-

i. **Ethnobotany and Biodiversity conservation**-

- **Course Objectives:**
- To acquaint the student with the relation between plants and local communities and sustainable utilization of various ethnobotanical plants and to understand its methods.
- **Course outcome:**
- Student will able to know the understand the relation between local tribes and plants, various uses of plants for treatment of ailments and ethnobotanical uses

ii. Ethnobotany , Bio-prospecting and traditional knowledge-

- **Course Objectives:** To acquaint the students with various tribal communities of Himachal Pradesh and plants used by them as traditional medicines.
- **Course outcome:**
- Student will able to know about tribal communities and their various customs and belief.
- Plants used by them as food, medicines and fodder.
- Indigenous system of medicines.

405-

i. Advances in Plant Physiology and biochemistry – I
ii. Advances in Plant Physiology and biochemistry – II

406-

i. Phytochemistry and Palynology of Plant kingdom – I
ii. Phytochemistry and Palynology of Plant kingdom – II

Course M.Sc. - ZOOLOGY

Course Code	Title of the course	Periods (60 m) Per week	Theory Exam	Practical Exam	IA (I+II)	Total Marks	Exam. Duration Hrs.)
	SEMESTER I						
MZOO-101	Biosystematics and Taxonomy	4	40		40	80	3
MZOO - 101(P)		6	-	20		20	3
MZOO -102	Cell and Molecular Biology (Common Course)	4	40		40	80	3
MZOO - 102(P)		6	-	20		20	3
MZOO -103	Biochemistry and Metabolism (Common Course)	4	40		40	80	3
MZOO - 103(P)		6	-	20		20	3
MZOO -104	Tools and Techniques in Biological Sciences (Common Course)	4	40		40	80	3
MZOO 104(P)		6	-	20		20	3
Total						**400**	
	Semester-II						
MZOO -201	Structure and Functions of Invertebrates & Vertiberates	4	40		40	80	3
MZOO - 201(P)		6	-	20		20	3
MZOO -202	Ecology and Environment (Common Course)	4	40		40	80	3
MZOO - 202(P)		6	-	20		20	3
MZOO -203	Cytogenetics and Evolution (Common Course)	4	40		40	80	3
MZOO -		6	-	20		20	3

203(P)							
MZOO -204	Biostatistics and Bioinformatics (Common Course)	4	40		40	80	3
MZOO - 204(P)		6	-	20		20	3
Total						**400**	
	Semester-III						
MZOO -301	Insect Diversity and Physiology	4	40		40	80	3
MZOO - 301(P)		6	-	20		20	3
MZOO -302	Animal Physiology	4	40		40	80	3
MZOO - 302(P)		6	-	20		20	3
MZOO -303/ 304/305/306/ 307/308 Any two	Protein structure, function and evolution OR Mammalian Neurobiology OR Biology of Parasites OR Disease Biology OR Limnology OR Animal behaviour	4+4	40+40		40+40	80+80	3+3
MZOO -303/ 304/305/306/ 307/308 (P) Any two		6+6	-	20+20		20+20	3+3
Total						**400**	
	Semester -IV						
MZOO -401	Developmental Biology	4	40		40	80	3
MZOO- 401(P)		6	-	20		20	3

MZOO -402	Applied Zoology	4	40		40	80	3
MZOO 402(P)		6	-	20		20	3
MZOO -403/404/405/406/407/408 Select one Specialization with 2 courses of Theory and practical each -	**403 - Entomology** i. Advance topics in Entomology ii. Medical Entomology and Vector Biology **404- Fish and Fisheries** i. Fish and Fishries - I ii. Fish and Fishries - II **405- Cytogenetics** i. Cytogenetics – I ii. Cytogenetics – II **406- Biodiversity and Wildlife** i. Biodiversity and Wildlife – I ii. Biodiversity and Wildlife – II **407- Animal Physiology** i. Molecular Physiology ii. Comparative Endocrinology **408- Parasitology** i. Parasitology ii. Medical Parasitology	4+4	40+40		40+40	80+80	3+3
MZOO -403/404/405/406 (P)		6+6		20+20		20+20	3+3
Total						400	
MZOO -407	**PROJECT** (Assigned in 3rd semester and goes until 4th semester)					50	
Grand Total of Marks For the Course						1650	

Title of the course	**Course Outcomes**

MZOO-101 Biosystematics & Taxonomy	Course objectives: • Basic concepts of biosystematics and taxonomy, importance of taxonomy in other disciplines. • Recent trends in biosystematics. Different concepts of species. • Components and theories of biological classification. • Diff. methods of animal collection and identification. • ICZN: concept and important rules. • Various strategies for biodiversity conservation. Students were able to explain the following topics: • Biosystematics and taxonomy, aims and tasks of taxonomists. • Biological-, ecological-and evolutionary species concept. • Ecotaxonomy, numerical- and behavioral – taxonomy. • How to collect, identify and preserve diff. animal groups. • Taxonomic keys and rules of scientific nomenclature. Diff. conservation theories.
MZOO-102 Cell and Molecular Biology (Common Course)	To develop the understanding of • Difference between the plant cell and animal cell. • Structure and functions of the plasma membrane, cell walland various cell organelles. • Transportation across the cell membrane. • DNA, chromatin, chromosomes, cell division and programmed cell death. • Different levels of gene expression and their regulation • Transport and distribution of protein among cell organelles inthe cell. • Students were able to identify different cell organelles in the electron micrographs and various mitotic and meiotic stagesof cell division. They could differentiate between euchromatin and heterochromatin.
MZOO-103 Biochemistry and Metabolism (Common Course)	Students should develop the understanding of: • Concept of pH, buffers and free energy etc. • Law of thermodynamics. • Preparation of solutions of different concentrations and molarities. • Carbohydrates, lipids, amino acids, proteibns and nucleic acids in detail. • Nitrogen fixation and role of microbes in it. • Secondary metabolites. • Students were able to prepare the solutions of different concentrations and could identify the carbohydrates, lipids, proteins and amino acids in the test sample

MZOO-104 Tools and Techniques in Biological Sciences (Common Course)	**Course objectives:** • Develop scientific –technical expertise, culture and work habits • Familiarize with the basic tools and techniques of scientific study and emphasis on biological sciences. • Develop basic understanding of the equipment's usage. **Course outcome:** Student will be able to • Demonstrate a general understanding of the standard laboratory tools, methodology, and process of biological research and basic scientific writing. • Design and conduct independent laboratory or field research that is consistent with the highest standard and practices of research in the relevant biological sub-discipline.
MZOO -201 Structure and Functions of Invertebrates & Vertebrates	Course objectives: • Diagnostic features of invertebrates for their identification and classification. • Coelom: arrangement in diff. invertebrate phyla. • Protostomia and deuterostomia. • Invertebrates: various locomotory organs, excretory organs, respiratory organs, respiratory pigments, feeding mechanisms, nervous system and parasitic larvae. • Physiology of respiration and excretion in invertebrates. • Other minor phyla of invertebrates. Students were able to explain the following topics: • Identify and classify the invertebrates. Protostomia and deuterostomia. • Coelom in invertebrates. • Various locomotory organs, excretory organs, respiratory organs, respiratory pigments, feeding mechanisms , nervous system and parasitic larvae of Invertebrates . Physiology of respiration and excretion in invertebrates.
MZOO-202 Ecology and Environment (Common Course)	Students should know about • Climate, soil and vegetation patterns • Ecosystem, communities, populations, species, biomes and succession • Population dynamics: factors that affect its size and distribution, growth curves-J and S curve, carrying capacity,habitat and niche • Species interactions : intraspecific and interspecific interactions, predation, competition, mutualism,symbiosis,parasitism,commensalism • Energy flow in ecosystem • Terrestrial, aquatic and ocean ecosystem • Biological diversity role • Speciation and isolation • Environmental pollution • Ecological management and sustainable development • Tell about various positive and negative interactions incommunity • Understand the contemporary environmental issuesincluding global change and life on earth • Understand various factors affecting ecosystem and energyflow • Explore the ideas of ecological management and sustainable development

MZOO-203 Cytogenetics and Evolution (Common Course)	Students should know about • Mendelian inheritance and its modifications • Application of Mendel's law • Chromosome: organization and variation • Gene expression and its experimental aspects • Quantitative genetics • Population genetics • evolution : species concept and speciation • Molecular evolution The students were able to know about the basic concepts ofgenetics and applied aspects of genetics
MZOO-204 Biostatistics and Bioinformatics (Common Course)	Bioinformatics is a multidisciplinary field that combines biology, computer science, and statistics to analyse and interpret biological data. The primary objectives of bioinformatics are as follows: 8. Data Management: One of the key objectives of bioinformatics is to develop efficient methods for storing, organizing, and retrieving biological data, such as DNA sequences, protein structures, and gene expression profiles. 9. Sequence Analysis: Bioinformatics aims to analyze and compare DNA, RNA, and protein sequences to identify similarities, patterns, and functional elements. 10. Structural Bioinformatics: Bioinformatics plays a crucial role in predicting and analyzing the three-dimensional structures of biomolecules, such as proteins and RNA. 11. Functional Annotation: Bioinformatics tools and algorithms are used to assign functional annotations to genes and proteins. 12. Comparative Genomics: Bioinformatics facilitates the comparison of entire genomes across different species to uncover similarities, differences, and evolutionary relationships. 13. Drug Discovery and Development: Bioinformatics plays a significant role in drug discovery by facilitating the analysis of biological data to identify potential drug targets. **14.** Personalized Medicine: Bioinformatics enables the analysis of individual genomic and clinical data to tailor medical treatments based on an individual's genetic makeup. **Course Outcome:** A student completing a major in Bioinformatics shall be able to apply: • knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics • existing software effectively to extract information from large databases and to use this information in computer modeling • problem-solving skills, including the ability to develop new algorithms and analysis methods • an understanding of the intersection of life and information sciences, the core of shared concepts, language and skills the ability to speak the language of structure-function relationships, information theory,

	gene expression, and database queries
MZOO -301 Insect Diversity and Physiology	Course objectives: • Insect classification upto order level with local examples. • Insect: basic morphology, physiology of integumentary, digestive, excretory, respiratory, nervous and reproductive systems. Receptor and stridulatory organs. • Insect: growth and metamorphosis, pheromones and diapauses. • Apiculture,sericulture and lac culture. • Insect vectors of human diseases. • Chemical and biological control of insect pests. • Insect in service of forensic science. Digital presentations. Students were able to explain the following topics: • Insect classification and able to differentiate diff. insect orders. • Morphology and physiology of different systems of Insect. • Insect vectors, hormonal pheromones, Apiculture,sericulture and lac culture. • Chemical and biological control of insect pests. Insects in service of forensic science
MZOO -302 Animal Physiology	To enable the students understand following topics: • Digestion and absoption of major food stuff. • Control and coordination of digestion. • Blood pressure, blood flow and resistance to flow. • Vascular distensibility and compliance and body fluids. • Respiratory regulation of acid base balance. • Transport of oxygen and carbon dioxide. • Functional anatomy of kidney and nephron. • Urine formation • Ultrastructure of muscles, their mechanism of contraction. • Endocrine and reproductive physiology. • Receptors and environmental physiology. **COURSE OUTCOME:** Students were able to explain the following: • Process of digestion and absorption of carbohydrates, fats and proteins and different factors which regulate the process of digestion. • Basic concept and interrelationship among blood pressure, blood flow and resistance to blood flow. • Process of oxygen and carbon dioxide transport in body. • Process of urine formation in kidney and acid base balance. • Important endocrine glands and their secretions with functions. • Mammalian gonads and gametogenesis. • Mechano, phono, chemo and photoreception. • Acclimation, acclimatization, adaptation to high altitude and deep seadiving.
MZOO -303/ 304/ 305 /306/ 307/308 Any Two	**Protein structure, function and evolution** **Objectives:** The objectives of the course are: • To review the protein structure, including non covalent bonds. • To understand the role of proteins in cell signaling. • To know protein functioning and how they causes various genetic disorders,

Course Outcome

On completion of course students are able to

- Perform protein separation techniques and identify the protein.
- Estimate the protein concentration.
- Understand the protein half life and protein degradation.
- Use the protein databases.

OR

Mammalian Neurobiology

OR

Biology of Parasites

- Orign and evlution of parasitim.
- Study of life cycle,pathogenicity and prophylaxis of-
- Protozoan parasites of genera *Leishmania, Trypanosoma, Giardia, Balantidium, Plasmodium and Eimeria*
- Some trematodes viz. *Fasciola, Fasciolopsis, Clonorchis, Paragonimus, Dicrocoelium, Polystoma* and *Schistosoma.*
- Cestodes as *Taenia, Diphyllobothrium, Echinococcus, Hymenolepis* and *Diphylidium*.
- An acanthocephalan , *Macracanthorhyncus*
- Some parasitic nematodes e.g. *Ascaris, Entrobius, Ancylostoma, Wuchereria, Trichinella and Strongyloides.*

Course outcome:

Students were able to prepare the permanent slide of various protozoans and study their morphological features.

OR

Disease Biology

Objectives

- To understand the basic concept of disease, its types and control.
- To understand the the pathophysiology of diseases caused by bacteria and viruses.
- To know and understand salient metabolic disorders
- COVID-19 Pendemic origion, transmission and vaccination.
- Characteristics of various prokaryotic and eukaryotic vectors, transgenic and knockout organisms.
- Diagnosis of various Diseases with the help of PCR, RACE, RAPD, Site Directed Mutagenesis etc.
- To understand the concept of Gene therapy, stem cells to repair tissue damage, Nanotechnology and targeted tissue engineering.

Outcomes:

Students will be able to

- Perform various diagnostic techniques used in Disease biology.
- Identify and control various diseases
- Differentiate between healthy and damaged tissue

OR

Limnology

OR

Animal behaviour

MZOO -401 Developmental Biology	Students should be able to know the following: • Scope, science and applications of developmental biology. • Different developmental patterns in metazoan. • Origin and differentiation of germ cells. • Process of spermatogenesis and oogenesis with its genetic aspect. • Process of fertilization, cleavage, blastulation and gastrulation in different animal groups. • Concept of fate maps, organizers and embryonic induction in different animal groups specially vertebrates. • Various processes involved in differentiation. • Early vertebrate development i.e. neurulation, development of ectoderm, mesoderm and endoderm. • Organogenesis in different vertebrates and cellular interactions during development of various organs. • Development and types of placenta with role of placental hormones.\ • Modern techniques in multiple ovulation and embryo transfer. Students were able to know and understand- • Science, scope and various applications of developmental biology. • Various phenomena in development of metazoans especially vertebrates aided by slides and digital presentation. • Modern techniques of ovulation, IVF, cryopreservation and embryo transfer.
MZOO -402 Applied Zoology	Students will be able to learn and understand the following: • Process, techniques and species used for sericulture, apiculture ad pisciculture with emphesis on species used in Himachal Pradesh. • Principles and practices of pest control; chemical, biological and genetic control. • Biology and control of some important agricultural pests and parasites. • Systematics, biology and control of some medically important parasites and vectors (insects). • Mode of transmission, epidemiology and control of important diseases caused by protozoa, viruses and bacteria. • Immunization and vaccination with current status of malarial vaccine. • Wild life conservation and concept of threatened species and endangered species of fauna. • Metabolic disorders regarding major food stuffs. • Different types of myopathies. • Students were able to learn and understand- • Economic importance of silk worm, honeybees and fishes and their rearing techniques. • How different pests can be controlled with minimum side effect on environment. • Biology, epidemiology and control of various human parasites, pathogens and vectors. • Concept of immunization and how vaccines are prepared. • Concept of wildlife conservation and its various programmes and strategies in India and world • What are metabolic disorders smd myopathies, theis reason of occurrence and how can be these managed.
MZOO - 403/404/405 /406/407/408	**403 - Entomology** i. Advance topics in Entomology ii. Medical Entomology and Vector Biology **Objective:**

Select one Specialization with 2 courses of Theory and practical each -	To enable the students understand the following topics: • Agricultural entomology including biology and control of some insect pests. • Various methods of insect control and toxicology. • Medical entomology including some vector born diseases and their control. • Insect sociobiology of honeybee, wasp, termite and ants. • Insect ecology. • Chemical and biological control of insect pests. Insects in service of forensic science **Course outcome:** Students were able to explain: • Life cycle and damaging types caused by different insect pests. • Physical, chemical, biologicalcontrol measures of different insect pest along with IPM. • Malaria, yellow fever, encephalitis, kala azar, leishmaniasis. • Foraging, orientation and various casts of honey bee. • Biotic and abiotic factors affecting the insect numbers. • Different species of honey bee and its sting apparatus. **404- Fish and Fisheries** i. Fish and Fishries - I ii. Fish and Fishries – II **405- Cytogenetics** i. Cytogenetics – I ii. Cytogenetics – II **Objectives:** Students should be able to know: • Basic analytical techniques in genetics using mutants and site directed mutagenesis. • Genome analysis using markers, cytogenetic and physical mapping. • Process of recombination and transposition at molecular level. • Computer analysis of genetic sequences and its basic principles. • Recombinant DNA and genetic engineering technology; gene cloning,gene therapy and DNA fingerprinting. • Human population genetics and its phenomenon. • Techniques used for prenatal diagnosis and process of genetic counseling. • Human immumnogenetics; genes related to immunoglobins, antibody diversity, autoimmune diseases, allergy, blood groups and transplant antigens. • Genetic bases of cancer and cancer therapy. • Human genome project and eugenics. **Course outcome:** Students were able to know and understand: • Analytical techniques used in genetics and their basic principles. • Molecular phenomena behind all genetic processes. • Computer programmes and techniques used for genetic analysis. • Procedure for genetic engineering, gene cloning, gene therapy and DNA fingerprinting. • Prenatal diagnostic techniques and genetic counseling. • Fundamentals of immunogenetics.

	• Oncogenes and cancer therapy • Human genome project. **406- Biodiversity and Wildlife** i. Biodiversity and Wildlife – I ii. Biodiversity and Wildlife – II **407- Animal Physiology** i. Molecular Physiology ii. Comparative Endocrinology **Objectives:** The objectives of the course are: • To enable students to understand the structure and role of organs and organ systems (Endocrine, nervous, muscular, respiratory and circulatory) in human health. • To enable students to understand the functioning of a living organism and its component parts. • To develop critical thinking skills in order to be able to think like a physiologist and solve physiologically relevant problems. **Outcomes:** On completion of course students are able to understand • Functions of important physiological systems including the cardio-respiratory, renal, reproductive and metabolic systems. • Interactions and interdependence of physiological and biochemical processes. • How these separate systems interact to yield responses to challenges such as exercise, fasting, ascent to high altitude, deep sea and in space; how they can sometimes fail. **408- Parasitology** i. Parasitology ii. Medical Parasitology

Bachelor of Education PO's, PSO's & CO's

Department of Education (B. Ed)

Bachelor of Education is a two year regular training course approved by NCTE affiliated to Himachal Pradesh University Shimla. The Curriculum of the course intends to professionally equip future teachers with necessary theoretical knowledge, practical skills and attitude to handle the challenges of the classroom in present scenario.

Program Outcome (PO's):-

- After completing the program outcomes are prospective Teachers.
- Have developed ample teaching skills and competence like communication, use of modern methodologies, use of learning resources, content transaction etc.
- Have developed eligibility to be a good future teacher at secondary school level and tobe able to fight state level as well as national level school teacher's recruitment competitions. Along with this they are able to pursue M.Ed, MA in Education andMA in Psychology.
- Are able to cater diverse needs of the learner at secondary stage of teaching as they have developed good understanding of the learner.
- Have developed employability skills and contribution to the society and nation by producing qualities students to spread the quality of education.

Program Specific Outcomes (PSO's):-

- The pupil teacher understands the process of learning and development among students different approach to learning and creates learning opportunities that are adapted to diverse learners and learning contexts.
- The pupil teacher plans learning experiences that are based on learner's existing proficiency, interest, experiences including misconceptions errors and understanding of the process of viewing, developing and making sense of subject matter contained inthe learning experiences.
- The pupil teacher uses knowledge of effective verbal, non verbal and media communication techniques to foster active injury collaboration and supportive interaction in the classroom.
- The pupil teacher understand the central concepts tools of inquiry and structure of the disciplines and can create learning experiences that make their aspects of subject matter meaningful.
- The pupil teacher acts as an agent of modularization and social change.
- The pupil teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.
- The pupil teacher develops self identity as a teacher through micro teacher simulation teaching school based teaching experience and reflective practices that continually evaluate the effects of his/her choices and action.
- The pupil teacher promotes capabilities for inculcating national values and goals as mentioned in the constitution of India.
- The pupil teacher promotes social cohesion, international understanding andprotection of Human Rights and rights of the child.
- The pupil teacher becomes to use ICT in the teaching learning process.
- The pupil teacher learns to organise different curriculum and co-curricular activitiesfor all round development of the personality.

Sr. No.	Course Code	Name of Course	Theory Marks	Internal Assesment	Tot al Marks
B.Ed First Semester					
1	Paper I	Childhood and Development Years	80	20	100
2	Paper II	Contemporary India and Education	80	20	100
3	Paper III	Language Across the Curriculum	40	10	50
4	Paper IV	Understanding Disciplines and Subjects	40	10	50
5	Paper V	Text Reading and Reflections	40	10	50
Total Marks in First Semester			**280**	**70**	**350**
B.Ed Second Semester					
1	Paper VI	Learning and Teaching	80	20	100
2	Paper VII	Assessment for Learning	80	20	100
3	Paper VIII	Drama and Art in Education	40	10	50
Candidates are required to choose any two of the following subjects in Second Semester in accordance with the subjects studied at graduation level.					
4	Paper IX-A	**Pedagogy of School Subjects (Part-1)**			
	(i)	Teaching of Physical Sciences	40	10	50
	(ii)	Teaching of Life Sciences	40	10	50
	(iii)	Teaching of Mathematics	40	10	50
	(iv)	Teaching of Social Sciences	40	10	50
	(v)	Teaching of Commerce	40	10	50
	(vi)	Teaching of English	40	10	50
	(vii)	Teaching of Hindi	40	10	50
	(viii)	Teaching of Sanskrit	40	10	50
5	Paper X	Practice Teaching (4 Weeks Duration)	Grading (on Four Points Letter Grades) will be done on the basis of reports submitted by the students.		
	Total Marks in Second Semester		**280**	**70**	**350**
B.Ed Third Semester					
Candidates will continue with same two Teaching subjects in Third Semester which they have opted in the Second Semester					
1	Paper IX-B	**Pedagogy of School Subjects (Part – 2)**			
	(i)	Teaching of Physical Sciences	40	10	50
	(ii)	Teaching of Life Sciences	40	10	50
	(iii)	Teaching of Mathematics	40	10	50
	(iv)	Teaching of Social Sciences	40	10	50
	(v)	Teaching of Commerce	40	10	50
	(vi)	Teaching of English	40	10	50
	(vii)	Teaching of Hindi	40	10	50
	(viii)	Teaching of Sanskrit	40	10	50
School Internship / Practice Teaching					
2	Paper XI - A	Skill in Teaching (School Subject – 1)	125		
3	Paper XI –B	Skill in Teaching (School Subject – 2)	125		
Total Marks in B.Ed Third Semeter			80+25	20	350

B.Ed Fourth Semester					
1	Paper XII	Knowledge and Curriculum	80	20	100
2	Paper XIII	Gender, School and Society	40	10	50
3	Paper XIV	Inclusive School	40	10	50
4	Paper XV	ICT in Teaching-Learning Process	40	10	50
5	Paper XVI	Understanding the Self	40	10	50
Candidates are required to choose any one of the following optional subjects in Fourth Semester					
6	Paper XVII	Health and Physical Education	40	10	50
7	Paper XVIII	Vocational and Work Education	40	10	50
8	Paper XIX	Education for Peace	40	10	50
9	Paper XX	Guidance and Counseling	40	10	50
Total Marks in B. Ed. Fourth Semester			280	70	350
		Grand Total Marks for B.Ed Course	1170	230	1400

Course Outcomes (CO's)
At the end of the course prospective Teachers

Sr. No.	Course Code	Name of Course	Outcomes
B.Ed First Semester			
1	Paper I	Childhood and DevelopmentYears	Understand the concept of Educational psychology .They acquire different knowledge about growth and development, creativity, personality, mental hygiene intelligence individual difference and diverse learners and their characteristics with remedial measures.
2	Paper II	Contemporary India andEducation	Apply the knowledge of different provisions exists in Indian constitution and contribute for eradication of social discrimination. Reflect the issues related to Educational development environmental pollution and regeneration of environment.
3	Paper III	Language Across theCurriculum	Describe latest methods and approaches for planning of successful language teaching, practice learner, child centred method, techniques in classroom and use of technology to enrich language teaching.

4	Paper IV	Understanding Disciplines and Subjects	Differentiate between school subjects and curriculum and integrate and apply the concept in real classroom situation.
5	Paper V	Text Reading and Reflections	Develop professionally and support their aspirations as a teacher, learn to read newspaper follow radio, TV, Internet media etc critically with understanding.
Total Marks in First Semester			
B.Ed Second Semester			
	Paper VI	Learning and Teaching	Apply the knowledge and
1			understanding learning process, principal, and theory of learning with educational applications and identify different learning style of learners and types of models of teaching and apply all in realclassroom situation.
2	Paper VII	Assessment for Learning	Apply the knowledge of assessment procedure and techniques in the improvement of teaching learning process. Validate the indicators to assess learner's performance, issues in the evaluation and use technology based assessment in schools.
3	Paper VIII	Drama and Art in Education	Understand the concept, importance of various arts, methods and technique of teaching create arts in human life and apply in real classroom situation during skill in teaching.
Candidates are required to choose any two of the following subjects in Second Semester in accordance with the subjects studied at graduation level.			
4	Paper IX-A	**Pedagogy of School Subjects (Part-1)**	
	(i)	Teaching of Physical Sciences	To understand and apply various approaches methods and appropriate use of different Audio-Visual Aids in Teaching of Physical Science, teaching of life Science, Teaching of Mathematics, Teaching of Social Science, Teaching of Commerce, Teaching of Hindi, and Teaching of Sanskrit.
	(ii)	Teaching of Life Sciences	
	(iii)	Teaching of Mathematics	
	(iv)	Teaching of Social Sciences	
	(v)	Teaching of Commerce	
	(vi)	Teaching of English	
	(vii)	Teaching of Hindi	
	(viii)	Teaching of Sanskrit	
5	Paper X	Practice Teaching (4WeeksDuration)	Grading (on Four Points Letter Grades) will be done on the basisof reports submitted by the students.
	Total Marks in Second Semester		
B.Ed Third Semester			

Candidates will continue with same two Teaching subjects in Third Semester which they have opted in the Second Semester			
1	Paper IX - B	**Pedagogy of School Subjects (Part – 2)**	
	(i)	Teaching of Physical Sciences	To understand and apply various approaches methods and appropriate use of different Audio- Visual Aids in Teaching of Physical Science, teaching of life Science, Teaching of Mathematics, Teaching of Social Science, Teaching of Commerce, Teaching of Hindi, and Teaching of Sanskrit.
	(ii)	Teaching of Life Sciences	
	(iii)	Teaching of Mathematics	
	(iv)	Teaching of Social Sciences	
	(v)	Teaching of Commerce	
	(vi)	Teaching of English	
	(vii)	Teaching of Hindi	
	(viii)	Teaching of Sanskrit	
School Internship / Practice Teaching			
2	Paper XI - A	Skill in Teaching (School Subject – 1)	Acquired with modest skills and methodologies of Teaching in their respective course of Teaching.
3	Paper XI –B	Skill in Teaching (School Subject – 2)	
Total Marks in B.Ed Third Semeter			
B.Ed Fourth Semester			
1	Paper XII	Knowledge and Curriculum	Understand the concept, principles of classroom management and different components of Human and material resources of school.
2	Paper XIII	Gender, School and Society	Acquire knowledge about gender issues in school curriculum, textual materials across discipline, pedagogical processes and its interaction with class, cast, religionand different concept like gender bias, gender stereo type, masculinity and feminism etc.
3	Paper XIV	Inclusive School	Acquire and apply knowledge about inclusive education and pedagogical approaches for CWSN and barriers to learning and participating of CWSN.
4	Paper XV	ICT in Teaching-Learning Process	Acquire the knowledge of different hardware and technologies in modern education practices and role of ICT in teaching learning process and apply the knowledge in real classroom situation.
5	Paper XVI	Understanding the Self	Replicate the basic human values in the society and reflect on the contribution of different agencies in promotion of human values. Apply psychological and physiological and scientific basis of Yoga for self and communitydevelopment.
Candidates are required to choose any one of the following optional subjects in Fourth Semester			

6	Paper XVII	Health and Physical Education	Acquire Apply the knowledge of physical education to organise sports events in school.
7	Paper XVIII	Vocational and Work Education	
8	Paper XIX	Education for Peace	
9	Paper XX	Guidance and Counseling	

Mechanisms of Communications of outcomes are:

- Class Tests
- Day to day evaluation
- Mid Term Examination
- Annual Report present by Principal
- Reflect on College Prospectus
- University website

Courses Outcomes of Chemistry Subject in B.Sc. Physical Science

Course Code	Course Title	Course Outcome
YEAR-I	**YEAR-I**	**YEAR-I**
CORE COURSE-II CHEM101TH	Atomic Structure, Bonding, General Organic Chemistry and Aliphatic Hydrocarbons	• Bohr's Theory and its limitations, basic description about wave mechanical aspect of atomic structure, 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 VB Theory and VSEPR Theory • 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. • 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 Aliphatic Hydrocarbons Lab.	• Experimentally performs volumetric determination by neutralization and redox titrations this provokes analytical skills in students. • To separate the mixture by chromatography prepares students to learn separations using this technique in industrial as well as medical areas. • Purification of the organic compounds by

		crystallization and distillation are designed to develop purification skills in students. • 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-V CHEM 102 TH	States of Matter, Chemical Kinetics & Functional Organic Chemistry	•Detailed description of gas laws and effect of conditions on the physical properties of gases will help students to understand the behavior of gases under different conditional parameters. •Good understanding of the properties such as surface tension and viscosity of liquid state of matter and how does these properties get affected by temperature and pressure. •Detailed description of solid state of matter including its structural aspects and techniques like XRD to characterize the structure of a solid. Will provide the valuable theoretical knowledge about the XRD technique used in many sectors of pharmaceutical industry as well as in research and development. •Chemical kinetics will provide the detailed explanation of the rates and order of the chemical reactions and how we can study the reaction on the basis of the kinetics of the same will enable students to understand the mechanism and factors affecting the reaction under study. •Preparation, Chemical reaction such as electrophilic substitution of aromatic hydrocarbonhelps students to understand the nature and behavior of aromatic compounds mainly benzene. •Preparation and chemical reaction of Alkyl halide, alcohol and phenol, aldehydes and ketones root into the understanding of physical and chemical properties of these compounds and it will also help to understand the applications of basic concepts of Organic Chemistry and how to utilize these concepts in order to have a good understanding of organic reactions and their mechanism related to these compounds and how the concepts can be used further for the better understanding of Organic Chemistry.
CHEM 102 PR	States of Matter, Chemical Kinetics &Functional Organic Chemistry Lab.	•Determinationofthe surfacetension and viscosityofa liquidora dilutesolutionusinga stalagmometer and Ostwald viscometer helps to understand these important properties of the liquid and the handling of standard equipments in order to develop their hands on experience. •The students willdevelop keen interest in the basic concepts of Chemical Kinetics andhow to study the kinetics of simple chemical reactions as per the syllabus. •Organic qualitative analysis to detect the extra elements such as nitrogen, Sulphur and halogens present in the organic compound and how these can help to understand the nature of organic compound in

		term of the functional group present.
YEAR-II	**YEAR-II**	**YEAR-II**
CORE COURSE-VIII CHEM 201TH	Solutions, Phase Equilibria, Conductance, Electrochemistry and Organic Chemistry	• Types of solution and their principles • Understand ideal and non ideal solutions as well as the basic concept in phase equilibrium. • 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. • Using conductometric and potentiometric titrations for acid base system • Study Basic concepts and applications of electrochemistry. • Study preparations, physical and chemical properties of carboxylic acids, their derivatives, amines and diazonium salt. • Classification, structure and configuration of carbohydrates
CHEM 201PR	Solutions, Phase Equilibria, Conductance, Electrochemistry & Organic Chemistry	• 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 • Organic analysis for given organic functional group present in an organic compound qualitatively.
CORE COURSE-XI CHEM 202 TH	Chemistry of main group elements, chemical energetic, chemical and ionic equilibria.	• Basic knowledge of main group elements and their detailed physical and chemical properties • Basic laws and principles of thermodynamics make students to understand working of engines • Understanding thermodynamic data to calculate bond energies and entropies of substances. Application of chemical equilibrium to variousphysical processes in our daily life. • Detailed description of chemical equilibrium, Concepts of weak and strong electrolyte and Buffer solution impart insight to understand solution chemical properties.
CHEM 202 PR	Chemistry of main group elements, chemical energetic, chemical and ionic equilibria	Inorganic analysis for given inorganic compound qualitatively. Knowledge of thermo chemistry for calculation of various types of enthalpies. Learn to handle pH meter and calculate pH for different solutions.
Skill Enhancement Course (SEC-I) CHEM203TH	Basic Analytical Chemistry	**Basic Analytical Chemistry** • Skill enhancement courses are designed to increase the technical and experimental skills of students in chemistry.

		• This course develops the analytical thinking and awareness about applications of analytical chemistry to soil, food and environment. • Students know the analysis methods and analytical principles and techniques. • A part of this course develops industrial skills and awareness regarding adulterations, contaminants and pollutants etc.
YEAR-III	**YEAR-III**	**YEAR-III**
DSE-2A CHEM301TH	Polynuclear hydrocarbons, dyes, heterocyclic compounds and spectroscopy (UV,IR,NMR).	• Understand polynuclear hydrocarbons including naphthalene, anthracene and phenanthrene involving their synthesis, reactions and reactivity • Understand chemistry of various dyes • Understand heterocyclic compounds involving pyrrole, furan, thiophene, indole, quinoline and isoquinoline involving their aromatic character,reactions, synthesis and their properties • Application of UV, IR spectroscopy in organic molecules to characterize organic molecules. • Understand the basic concepts of NMR, shielding and deshielding, chemical shift and how to characterize a compound in NMR
CHEM301PR	Polynuclear hydrocarbons, dyes, heterocyclic compounds and spectroscopy (UV,IR,NMR) lab.	• Able to separate ion and mixture by the use of chromatographic technique. Able to prepare complexes and measure their conductivity.
DSE-2B CHEM 304	Chemistry of transition and inner transition elements, coordination chemistry, organometallics, Acids and bases	• Able to understand synthesis, behavior of various transition metals inorganic compounds • Understand basic introduction about transition metals including configuration, oxidation states, colour, magnetic behavior. • Understand basic introduction about inner transition metals including lanthanide contraction, configuration, oxidation states, colour, magnetic behavior and ion exchange separation. • Able to understand about valence bond theory, isomerism and their types, can learn how to draw structures of compounds • Learn about organometallic compounds, hepticity, zeise salt, ferrocene, metal carbonyls and their structure and bonding. • Able to understand Crystal field theory and splitting in octahedral, tetrahedral, tetragonal and square planar complexes, Jahn teller distortion, how to find CFSE. • Able to understand basic concepts of acid and bases, HSAB principle.
DSE-2B CHEM 304PR	Chemistry of transition and inner transition elements, coordinatiochemistry, organometallics, Acids and bases lab	• Inorganic preparation of complexes, complexometric titration, iodometric and gravimetric estimation of complexes.

SEC- 4 (SEC-IV) CHEM 308TH	Pesticide Chemistry & Pharmaceutical Chemistry	**Pesticide Chemistry & Pharmaceutical Chemistry** • Gains knowledge of benefits and adverse effects of pesticides, structure activity relationship in pesticides. • Come to understand synthesis and uses of some organochlorines, carbamate, organophosphates, amides and quinines class pesticide compounds and their formulations. • Synthesis of various classes of drugs, design and development, e.g. antibiotics, cardiovascular drugs, antipyretics, analgesics and antiviral drugs etc. • Students get knowledge of fermentation methods of alcohol, citric acid, drugs, vitamins and amino acid synthesis.

MATH

MATH COURSES						
Course type Course Code	**Course Title**	**Credit**	**ESE**	**CCA**	**Max. Mark**	**Exam. Duration Hours.**
	YEAR-I					
CORE COURSE-III MATH101TH&IA	Differential Calculus	**6**	**70**	**30**	**100**	**3**
CORE COURSE-VI MATH102TH &IA	Differential Equations	**6**	**70**	**30**	**100**	**3**
	YEAR-II					
CORE COURSE-IX MATH201TH &IA	Real Analysis	**6**	**70**	**30**	**100**	**3**
CORE COURSE-XII MATH202TH &IA	Algebra	**6**	**70**	**30**	**100**	**3**
DSE -3A MATH301TH&IA	MATRICES	**6**	**70**	**30**	**100**	**3**
	YEAR-III					
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 MATH 316 TH&IA	Theory of Equations.	**3**	**70**	**30**	**100**	**3**
SEC- 4 MATH 316 SE	OR Theory of Equations.	**1**	**-**	**-**	**-**	**2**
Total		**44**			**800**	

B.Sc. PHYSICAL SCIENCE COURSES OUTCOMES.		
Course Code	**Course Title**	**Course Outcome**
	YEAR-I	
CORE COURSE-III MATH101TH MATH101IA	Differential Calculus	**Differential Calculus** • Use of ε - δ 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 Jacobeans'.
CORE COURSE-VI MATH102TH &IA	Differential Equations	• 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 Langrange'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 lustration only.
	YEAR-II	
CORE COURSE-IX MATH201TH MATH201IA	Real Analysis	• 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.
CORE COURSE-XII MATH202TH MATH202IA	Algebra	• 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	
DSE -3A MATH301TH	MATH301TH	• Study of different types of Matrices. • Students learn to find rank and inverse of matrices by use of elementary transformations. • Solve linear homogeneous and non-homogeneous equations by matrix method. • Study translation, dilation, rotation and reflection in a point, line and plane. • Learn the concepts of linear dependence and independence, linear span, basis and dimension. • Study concepts of vector spaces and subspaces. • Relate matrices to linear transformation and vice-versa.
DSE-3B MATH304 TH	Numerical Methods	**Numerical Analysis** • 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	**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.

❖ 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.

BCA Program outcomes

1. All theoretical concepts are implements in practical which make a student industry ready.
2. Concept of the course prepares a student for self entrepreneurship.
3. The syllabi of the course are a good platform for higher level course in computer application.
4. The course is designed to support automation and digitization in all walks of life.
5. The course enables the students to keep pace with the fast changing world.
6. The course opens up vast horizons of contemporary knowledge and techniques.
7. To apply the knowledge of mathematics, accounting, programming and computing fundamentals to solve world challenging problems in diverse domains.
8. To communicate effectively and present as well as comprehend technical information in oral and written form for various purposes
9. To develop habit of incessant learning for carrier development and progress as a dynamic computer professional.
10. To apply the inherent skills as a successful entrepreneur.
11. To design and develop software application with specific considerations for societal, cultural and environmental aspects.

course code	Title of Course	Course Outcomes
BCA0101	Mathematics-I	The syllabus of this course is specially designed for the beginners in computer science with the first exposure to mathematical topics essential to their study of computer science or digital logic. After the completion of the course the student would be able to understand the concept of set theory, trigonometry, differential calculus, integral calculus, limit, matrices etc.
BCA0102	Applied English	Should develop and improve their communication skills. Should be able to write formal and informal invitations and letters. Should be able to use words/phrases in their own sentences. Should improve their compression and drafting skills.
BCA0103	Computer Fundamentals	● Define and distinguish Hardware and Software components of computer system ● Identify and discuss the functional units of a computer system. ● Identify the various input and output units and explain their purposes.
BCA0104	C-Language	● To clearly understand the logic of the problem. ● To analyze the given problem and write the algorithm, flowchart. ● To write structured C programs, this is the foundation of any Programming language.
BCA0105	Office Automation Tools	This course trains students how to use MS Office applications to carry out office work such as creating professional- quality documents; store, organize and analyze information, arithmetic operations and functions; and create dynamic slide presentations with animation,

		images, videos etc. effectively.
BCA0201	Mathematics - II	After the completion of the course the student would be able to understand the concept of number system, group, Ring theory , general theorem and their geometrical significance etc.
BCA0202	Communicative English	Upon successful completion of the course, the student would be able to communicate in any professional environment.
BCA0203	Digital Electronics	● The students can design combinational and sequential digital logic circuits. ● Also they will have knowledge on Programmable Logic devices and its usage. ● Knowledge of circuit designing
BCA0204	Data Structures	● Understand the need for Data Structures when building application. ● Appreciate the need for optimized ● Able to walk through insert and delete for different data structures
BCA0205	Database Management System	● Able to master the basic concepts and understand the applications of database systems. ● Able to construct an Entity- Relationship (E-R) model from specifications and to transform to relational model. ● Able to construct unary/binary/set/aggregate queries in Relational Algebra. ● Understand and apply database normalization principles. ● Able to construct SQL queries to perform CRUD operations on database (Create, Retrieve, Update,Delete). ● Understand principles of database transaction management, database recovery, security.
BCA0301	Mathematics - III	After the completion of the course the student would be able to understand the standard technique of solving linear differential equation, complex number, primes, Chinese Remainder Theorem, finite field , group field etc.
BCA0302	Business Practices and Management	After going through the syllabus a student will have a proper idea of business, management and functions undertaken by a manager.
BCA0303	Computer Organization	● Ability to understand basic structure of computer. ● Ability to perform computer arithmetic operations. ● Ability to understand control unit operations.
BCA0304	Object Oriented Programming with	● An understanding of the principles behind the object oriented development

	C++	● Competence in the use of object oriented programming language in the development of small to medium sized application programs.
BCA0305	Desktop Publishing and Designing	● Create, edit, and print long documents including supporting pages ● Effective design and layout rules used in publication industry ● Scanning and importing graphics ● Format page layout utilizing master pages tool,Competencies, Skills
BCA0401	Personnel Management	● Develop a thorough grounding in (and sensitivity to) the human resource impact on organizations. ● Assist students in relating the management of human resources to organizational effectiveness. ● Understand the link between personnel management and larger macro issues of current concern
BCA0402	Accounting	● Familiarize with the concept of accounting. ● After completion of this course, candidate would be able to record and post transactions in the basic accounting equation and maintain subsidiary ledgers.
BCA0403	System Analysis and Design	● Gather data to analyse and specify the requirements of a system. ● Design system components and environments. ● Build general and detailed models that assist programmers in implementing a system. ● Design a database for storing data and a user interface for data input and output, as well as controls to protect the system and its data.
BCA0404	Internet Technology & Web Page Design	● Students will be able to write a well formed / valid XML document. ● Students will be able to write a server side java application called Servlet to catch ● Update and delete operations on DBMS table. Students will be able to write a server side java application called JSP to catch form.
BCA0405	Programming in Visual Basic	● Design , create , build and debug Visual Basic application ● Explore VB's (Integrated Development Environment)IDE ● Apply arithmetic operation for displaying numeric output ● Applying control structures for determining different operations ● Applying procedures, sub-procedures and functions to create manageable codes ● Creating windows applications using forms, controls and events

BCA0501	Operating System	● Analyze the concepts of processes in operating system and illustration of the scheduling of processor for a given problem instance. ● Identify the dead lock situation and provide appropriate solution so that protection and security of the operating system is also maintained. ● Analyze memory management techniques, concepts of virtual memory and disk scheduling. ● Understand the implementation of file systems and directories along with the interfacing of IO devices with the operating system.
BCA0502	eCommerce	● Discuss legal issues and privacy in E-Commerce. ● Assess electronic payment systems. ● Recognize and discuss global E-commerce issues. ● Describe the infrastructure for E-commerce.
BCA0503	Management Information System	● Use analytical and reflective skills in decision making. ● Communicate effectively both orally and in writing. ● Recognize legal and ethical issues confronting them. ● Contribute to the performance of a group within a business setting.
BCA0504	ASP.net Technologies	● Create a web form with server control. ● Separate page code from content by using code-behind pages, page controls and components ● Display dynamic data from a data source by using data binding. ● Debug ASP.NET pages by using trace.
BCA0505	Computer Oriented Statistical Methods	● To understand the concept of population and sample. ● To use frequency distribution to make decision. ● To understand and to calculate various types of averages and variation. ● To use the concept of probability in business.
BCA0601	Computer Networks	● Identify the different components in a Communication System and their respective roles. ● Describe the technical issues related to the local Area Networks. ● Identify the common technologies available in establishing LAN infrastructure
BCA0602	Numerical Methods	● Be aware of the use of numerical methods in modern scientific computing ● Be familiar with finite precision computation ● Be familiar with numerical solutions of nonlinear equations in a single variable ● Be familiar with numerical interpolation and approximation of functions ● Be familiar with numerical integration and differentiation ● Be familiar with numerical solution of ordinary differential equations

		● Be familiar with calculation and interpretation of errors in numerical methods,
BCA0603	Multimedia Technology	● Plan experiments to test user perception of multimedia tools. ● State the properties of different media streams; compare and contrast. Different multicast protocols. ● Describe different realisations of multimedia tools and the way in which they are used.
BCA0604	Computer Graphics	After completion of the course students understand basics of computer graphics, Input/output primitive and basic transformations, which can be applied on objects of graphics, Practical applications of graphics, Program development and basic animations without using graphical softwares.
BCA0605	Software Engineering	● Understand the importance of the stages in the software life cycle. ● Understand the various process models. ● Understand the UML notation. ● Be able to design software by applying the software engineering principles.
BCA0606	Major Project	To help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories. A student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal.

PROGRAMME OUTCOMES (PO'S); B.SC. LIFE SCIENCE PO's, PSO's & CO

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 repute 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 school systems, or in a related career following post graduation.

PO- 2 Logical and Analytic Thinking Ability

The graduate will acquire scientific temperament to analyze any problem he comes across bydemonstrating 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 andlisten clearly in person and trough 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 levelstudies. 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 moraldimensions of your decisions, and accept responsibility for them.

PSO-8 Environment and Sustainability

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

B.SC. LIFE SCIENCE COURSE STRUCTURE						
Paper Code	**Paper Title**	**Credit**	**ESE**	**CCA/ IA**	**Max. Mark**	**Exam Duration Hours.**
First Year	**First Year**					
Ability Enhancement Compulsory Course	i. Environmental Science ENVS IAECC02 ii. English/Hindi/ SKT	4	70	30	100	3
DSC-Botany I BOTA 101 TH	Biodiversity (Microbes, Algae, Fungi and Archegoniate)	4	50	30	80	3
DSC- I Practical BOTA 101PR	Biodiversity (Microbes, Algae, Fungi and Archegoniate)	2	20	-	20	3
DSC- Zoology I ZOOL 101TH	Animal diversity	4	50	30	80	3
DSCZoology I Practical ZOOL 101PR	Animal diversity	2	20	-	20	3
DSC-Botany II BOTA 102 TH	Plant Ecology and Taxonomy	4	50	30	80	3
DSC-Botany II BOTA 102 PR	Plant Ecology and Taxonomy	2	20	-	20	3
DSC-Zoology II ZOOL102TH	Comparative Anatomy and Developmental Biology of Vertebrates	4	50	30	80	3
DSC-Zoology II ZOOL102PR	Comparative Anatomy and Developmental Biology of Vertebrates	2	20	-	20	3
	Second Year					
DSC-Botany III BOTA201 TH	Plant Anatomy and Embryology	4	50	30	80	3
DSC-Botany III BOTA201 PR	Plant Anatomy and Embryology	2	20	-	20	3
DSC-Botany IV BOTA201 TH	Plant Physiology and Biochemistry	4	50	30	80	3
DSC-Botany IV BOTA201 PR	Plant Physiology and Biochemistry	2	20	-	20	3
DSC-Zoology III ZOOL 201 TH	Physiology and Biochemistry	4	50	30	80	3

DSC- Zoology III ZOOL 201 PR	Physiology and Biochemistry	2	20	-	20	3
DSC-Zoology IV ZOOL 201TH	Genetics and Evolutionary Biology	4	50	30	80	3
DSC-Zoology IV ZOOL 201PR	Genetics and Evolutionary Biology	2	20	-	20	3
SEC-I BOTA203 Or ZOOL 203	Bio-Fertilizers OR Medical Diagnostics Basic	4	70	30	100	3
SEC-II BOTA204 Or ZOOL 204	Gardening and Floriculture OR Apiculture	4	70	30	100	3
	Third Year					
DSE-Botany I BOTA 301 TH	Economic Botany & Biotechnology OR Analytical Techniques inPlant Sciences	4	50	30	80	3
DSE-Botany I BOTA 301 PR	Economic Botany & Biotechnology OR Analytical Techniques inPlant Sciences	2	20	-	20	3
DSE-Botany II BOTA 302 TH	Cell and Molecular Biology OR Bioinformatics OR Research Methodology	4	50	30	80	3
DSE-Botany II BOTA 302 PR	Cell and Molecular Biology OR Bioinformatics OR Research Methodology	2	20	-	20	3
DSE- Zoology I ZOOL 301 TH A,B,C	Applied Zoology (A) OR Animal Biotechnology (B) OR Aquatic Biology (C)	4	50	30	80	3
DSE- Zoology I ZOOL 301 PR A, B, C	Applied Zoology (A) OR Animal Biotechnology(B) OR Aquatic Biology(C)	2	20	-	20	3
DSE- Zoology II ZOOL 302 TH A, B, C	Insect, Vector and Diseases (A) OR Immunology (B) OR Reproductive Biology (C)	4	50	30	80	3

DSE- Zoology II ZOOL 302 PR A,B,C	Insect, Vector and Diseases (A) OR Immunology (B) OR Reproductive Biology (C)	2	20	-	20	3
SEC-III	Medicinal Botany & Ethnobotany (BOTA 306) OR Sericulture (ZOOL 303) OR Research Methodology (ZOOL 304	4	70	30	100	3
SEC-IV	Mushroom Cultivation Technology (BOTA 307) OR Aquarium Fish Keeping (ZOOL 304(A)	4	70	30	100	3

YEAR PaperCode	**Paper Title**	**Course outcome**
	First Year	
Ability Enhancement Compulsory Course	**i) Environmental Science ENVS IAECC02 ii) English/Hindi/SKT**	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, skillsetc. in English/Hindi/SKT and Environment science.
Discipline Specific Course Botany I (BOTA 101)	**Biodiversity(Microbes , Algae, Fungi and Archegoniate)**	• General structure of bacteria and viruses and theirmode of reproduction. • Classification of algae, fungi, archegoniates:(bryophytes, pteridophytes, gymnosperms) • Economic & ecological importance of algae,fungi & archegoniates. • Morphology and life cycle of *Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Ectocarpus, Polyspihonia* (algae); *Phytophthora, Rhizopus, Penicillium, Ventura, Puccinia, Agaricus,(fungi); Marchantia, Funaria, Sllaginella, Equisetum, Adiantum, Cycus & Pinus*(Archegoniates) • Transition plants from aquatic to terrestrialhabitat. • Symbiotic relationships :Lichens &Mycorrhiza • Stelar evolution in the Pteridophytes. • Fossil Pteridophytes: *Rhynia &Cooksonia* . • Classify and differentiate the specimens ofthallophyta and archegoniates. • Identify the algae, fungal & bacterial diseases ofplants by the external feature.

Discipline Specific Course Zoology I (ZOOL 101)	**Animals Diversity**	Students should be able to know the following • Classification of all the non chordate phylums andgeneral characters • Locomotory organelles and locomotion in protists • Canal system of *sycon* • Life cycle of *taenia solinum , asceris* • Metamerism in annelida, vision in astropoda, torsion in gastropods,water vascular system in asteroidea general characters & classification of protochordates, fishes, amphibia, reptilia, aves & mammals. • The students should be able to classify and differentiate between various of non chordates
Discipline Specific Course Botany II (BOTA 102)	**Plant Ecology and Taxonomy**	• To nomenclature, classify and identify thevarious plants • Herbarium – its functions, important herbariaand botanical gardens of world and India • Various banks, categories and taxonomic groups • Taxonomic evidences from palynology, cytology, photochemistry and molecular data. • To study about various phytogeographical zones • The various biotic and abiotic factors of ecosystem • Various plant communities • Knowledge of food chain, food web, ecologicalpyramids and biochemical cycles • Succession& its mechanism. • Flow of energy in various trophic levels. • To identify, classify and nomenclature of various angiospermic flowering plants in their surrounding • How various factors of ecosystem effect bioticand abiotc factors • How energy flows from one trophic level toother • Know about the pioneer communities, succession & mechanism. • History of plant systematic and basics ofclassification. • Working knowledge of ecological sampling & consequences of environmental problems
Discipline Specific Course Zoology II (ZOOL 102)	**Comparative Anatomy and Developmental Biology of Vertebrates**	Knowledge of integumentary system Evolution of visceral arches Brief idea of elementary canal and its glands Brief account of different respiratory organs Evolution of aortic arches& heart Succession of kidneys Structure of brain in different vertebrates classes Brief idea of sensory organs Development of embryos, placenta in mammals. Meta morphosis in frog. The students were imparted knowledge regarding above said objectives, which were testify through the oral tests, class tests, house tests etc.
Second Year		

Discipline Specific Course Botany III (BOTA 201)	**Anatomy and Embryology ofAngiosperms**	• Apical meristems and different types of planttissues • Anatomy of stem, root and leaf • Role of cambium in secondary growth in plants,wood types and cork • Various protective structures and adaptations ofxerophytes and hydrophytes • Structure of flower, micro and macro sporogenesis & types of embryosacs • Pollination and fertilization, seed structure andtheir dispersal. • embryo – endosperm relationship. Apomixis and polyembryony • Students were able to answer all the questionsconcerning cource objectives
Discipline Specific Course Zoology III (ZOOL 201)	**Physiology and Biochemistry**	• Structure of neuron, origin & propagation of nerve impulse Physiology of digestion, reproduction, pulmonary respiration, transport ofoxygen & carbon dioxide • Structure of nephron,composition of blood • Structure and function of endocrine glands& enzymes. • Metabolism of carbohydrates, lipids & proteins
Discipline Specific Course Botany IV (BOTA 202)	**Plant Physiology and Metabolism**	Students were enabled to understand the followingtopics: • Plant water relations, transpiration, guttation andstomatal movement. • Mineral nutrition and their absorption and transport mechanisms. • Photosynthesis: pigments, photosystems, photophosphorylation, photorespiration . • Animal respiration: glucose breakdown pathwaysand energy synthesis. • Enzyme: structure, function and properties.
Discipline Specific Course Zoology IV (ZOOL 202)	**Genetics and Evolutionary Biology**	• Mendel's work, aspects of inheritance, linkage, crossing over, chromosomal mapping,& mechanisms of sex determination, mutations • Evolutionary theories & evidences Concept of species, macro evolutionary principles & mass extinction. • Course outcome : the students must have clear concept of the above said objectives
SEC-II BOTA204 Or ZOOL 204	**Gardening and Floriculture OR Apiculture**	**Gardening and Floriculture** • Landscape design : • Gardening operation • Garden Designs, Principles, Types and Features. • Cultivation of ornamental plants . • Commercial floriculture ,Cultivation of Important flower crops . Course outcomes : Students were able to design the home landscape and to know the cultivation techniques of important flower crops and various ornamental plants . Students were able to design different kinds of garden and different techniques of Gardening operations. **piculture** History, classification & biology of honey bee Artificial bee rearing & knowledge of bee keeping equipments & method of honey extraction

		Knowledge of bee diseases & their controlmeasures. Knowledge of apiculture industry and entrepreneurship in apiculture. Course outcome: The student must have the knowledge of apiculture, disease in bees & their control and utilization of apiculture to increase the benefits & income.
Third Year		
DSE-Botany I **BOTA 301**	**Economic Botany & Biotechnology** **OR** **Analytical Techniques in Plant Sciences**	**Economic Botany &Biotechnology.** • Name of research centres and institute of Rice, Wheat, Maize, Potato. • Botanical description, cultivation practices, origin, distribution and economic importance of cereals, pulses, vegetables, diff. beverages, groundnut, sugarcane, spices, fibre yielding plant andmedicinal plants. • Biotechnology: meaning, scope and importance. Tissue culture technique and other biotechniques (vectors, transgenic plants, PCR, DNAfingerprinting). • Students were able to explain the following topics: • Name and location of diff. research centres andinstitutes. • Botanical descriptions, plant cultivation practices, origin, distribution and economic importance of cereals, pulses, vegetables, diff. beverages, groundnut, sugarcane, spices, fibre yielding plant and medicinal plants. Tissue culture technique and other biotechniques (vectors, transgenic plants, • PCR, DNA fingerprinting)
DSE-Botany II **BOTA 302**	**Cell and Molecular Biology** **OR** **Bioinformatics** **OR** **Research Methodology**	**Cell and Molecular Biology** • Basic technique in biology, cell organizations,. • Cell division: types and molecular control. • Genetic material and various experimental perspectives. • Gene expression and its regulation. • Students were able to explain the followingtopics: • Basic concepts of biology, different types ofmicroscopes, different cells and their organelles. • How parental characters transferred to theirprogeny. **Bioinformatics** • Bio-informatics: introduction, scope and research areas. • Biological databases: intro., classification andretrieval system. • NCBI: databases, retrieval tool, sequence submission. • EMBL Bank: introduction and analysis tools. • DDBJ, PIR. • Concept of MSA, SCORING MATRICES,PAM, BLOSUM. • Molecular phylogeny. • Bioinformatic applications and software. • Students were able to explain the followingtopics: • Bio-informatics, Biological databases, NCBI,EMBL-Bank, • Analysis tools for EMBL- Bank, DDJB, PIRand MSA.

		• Molecular phylogeny. **Research Methodology** Knowledge of various foundations of research • How to design research and need • How to collect • Thesis writing along with preparation of tables • Various ethical issues related to research.
DSE- Zoology I **ZOOL 301** **A,B,C**	**Applied Zoology (A)** **OR** **Animal Biotechnology (B)** **OR** **Aquatic Biology (C)**	**pplied Zoology** Biotechnology & its scope, applications, concept of gene manipulation, use of microbes & its benefits Concept of genetically modified organisms & their applications To develop the understanding of animal cell culture, genetic disorders & their diagnosis,knowledge of gene therapy. Students should be able to operate different equipments like centrifuge, PCR etc. & gel electrophoresis. They were able to culture the microbes.
DSE- Zoology II **ZOOL 302** **A, B, C**	**Insect, Vector and Diseases (A)** **OR** **Immunology (B)** **OR** **Reproductive Biology (C)**	**Insect, Vector and Diseases** • General features and morphology of insects • Brief introduction of carrier of vectors • Classification of insects upto orders • Insect vectors causing diseases • Fleas and flea borne diseases • Bugs as vectors. • Knowledge of insect morphology • Classification of class insect • Various vectors, their structure and the germscarried by them • Spread of diseases and prevention measures. **Immunology** • Basic concepts of immunology • Components of immune system • Haemopoiesis • Antigens and antibodies • Working of immune system • Immune system in health and diseases • Vaccines • Basic Knowledge of Immunology • Constituents of immune system Haemopoiesis Knowledge of antigens and antibodies Working of immune system Relation of immune system with health **eproductive Biology** Male and female reproductive organs General hormones (male & female) and theirworking Functional anatomy of male reproductive system of human & rat and function of different parts Functional anatomy of female reproductive system of human & rat and function of different parts Infertility in male & female Various assisted reproductive technology

		Modern contraceptive technologies. Morphology and anatomy of male & femalereproductive organs with their functional aspects Gonadal hormones associated with reproductionin male & female. Knowledge of infertility, various assisted technologies and modern contraceptive technologies in male and female.
SEC-III OR SEC-IV	**Medicinal Botany & Ethnobotany (BOTA 306) OR Sericulture (ZOOL303) OR Mushroom Cultivation Technology (BOTA307) OR Aquarium Fish Keeping (ZOOL 304(A) OR Research Methodology (ZOOL 304(B)**	**Sericulture** ourse objective: To provide students a thorough knowledge about the life cycle of silkworm, cultivation of mulberry, diseases and pests of the mulberry plant, maintenance of the farm, cocoon drying, harvesting, storage and silkworm rearing. To provide various skills those are necessary for self employment in the mulberry production/sericulture. Course Outcomes: Understand overall aspects of Sericulture, namely, Mulberry and non-mulberry silkworms and their food plants, Rearing of the silkworm, Silkworm pathology, Process of silkworm seed production and silk technology. Identify the diseases and pests of the mulberry plant and to learn disinfection procedures Relate various technologies involved in Sericulture and silk rearing. eady to be entrepreneurs in the mulberry production/sericulture **Research Methodology** Knowledge of various foundations of research How to design research and need How to collect Thesis writing along with preparation of tables Various ethical issues related to research.

PROGRAMME SPECIFIC OUTCOMES (BIOSCIENCES)

- ✓ **PSO-1**Understands the nature of basic concepts of cell biology, biochemistry, Taxonomy and ecology.
- ✓ **PSO-2**Students be able analyse the relationship among animals, plants and microorganisms.
- ✓ **PSO-3** Understands the utility of biological sciences in apiculture, aquaculture, agriculture and medicine.
- ✓ **PSO-4**The students of Zoology and Botany do study some of the common courses and they have the technical knowledge regarding the animals and plants which the other programmes do not impart.
- ✓ **PSO-5**The study of cytogenetics provides them the knowledge of genes, cell and inheritance. Evolutionary biology provides the knowledge of evolution of animals including man in nature: Medical diagnostics, applied Zoology and Insect vector study provides the knowledge of diseases, economic importance of animals and causative organisms of diseases respectively.
- ✓ **PSO-6** Biosciences students become able to understand cocepts and practical aspects of biochemistry, bioinformatics, Taxonomy, biological aspects related to economy and ecology.

COMMERCE PROGRAMME OUTCOME

The B.Com (pass course) provides an outcome in terms of following aspects

1. It gives an opportunity to the students to go for the professional courses like CA, ICWA, CS, Banking, Insurance, Logistics, Business Administration, marketing etc.
2. it provides a base to pursue higher education that is Masters Degree and Research.
3. with this the student becomes acquaint with different practical practicing and actual aspects like computer application software that is Tally (Standardized) and customized, filling of various returns online as well as offline, Computer aided auditing etc.
4. it prepares the students professionally to take various activities in various Industries.
5. the course creates confidence in the students which in turn make them capable of development of their personality and decision makers

Course Outcome (co's (FIRST YEAR)			
COURSE CODE	**COURRSE TITLE**	**NATURE OFF COURSE**	**COURSE OUTCOMES**
BC 1.1	**Financial Accounting**	**Core Course C-1**	➢ The objective of this paper is to help students to acquire conceptual knowledge of accounting, financial statements of different business organization. ➢ to impart skills for recording various kinds of business transactions and to follow accounting standards in India and at international level. ➢ Practical knowledge of Tally.
BC 1.2	**Business Organization and Management**	**Core Course C-1**	➢ The course aims to provide basic knowledge about business organizations and management of business Enterprises. ➢ Emerging opportunities in business like franchising Outsourcing e-Commerce. ➢ Technological innovations and skill development make in India Movement and functional areas of management like marketing management, human resource management, financial management etc.
BC 1.3	**Business Law**	**Core Course C-4**	➢ To impart basic knowledge of important business legislation that is Indian Contract Act sales of good goods act Indian Partnership Act Negotiable Instrument Act to make law to make aware of legal aspects with relevant case law.
BC 1.4	**Business Statistics and Mathematics**	**Core Course C-5**	➢ To familiarize students with the application of mathematics and Statistical Techniques in business decision making. ➢ How to collect edit classify, analyze and interpret data and its application.

SECOND YEAR			
COURSE CODE	**COURRSE TITLE**	**NATURE OFF COURSE**	**COURSE OUTCOMES**
BC 2.1	**Company Law**	**Core Course C-7**	➢To impart basic knowledge of the provisions of the Companies Act 2013. ➢To make aware regarding incorporation of company its registrations management Administration and winding up. ➢Emerging issues in company like CSR corporate social responsibility meeting through video conferencing, e-voting. ➢Case studies involving issues in company law.
BC 2.2	**Income Tax Law and Practice**	**Core Course C-8**	➢ to equip students with applications of principles and provisions of income tax 1961 and the relevant rules. ➢ to provide basic knowledge of assessment of income under various heads like salary us property profit and gains of business, capital gains, income from other sources. ➢ practical knowledge of e filing that is online filing of returns of income tax and TDS.
BC 2.3	**Computer Applications in Business**	**Skill Enhancement Elective course -1**	➢ to provide computer skills and knowledge of computer working processing creating business document splitting business spreadsheet. ➢ to announce the students understanding of usefulness information usefulness of Information Technology tools for business operations
B C 2.4	**Corporate Accounting**	**Core Course C-11**	➢ to enable the students to acquire the bass Gulab required required the basic knowledge of the corporate accounting. ➢ to learn the techniques of preparing the financial statements of company holding companies banking companies. ➢ preparation of cash flow statement as per Indian Accounting Standard(Ind-AS3)
BC 2.5	**Cost Accounting**	**Core Course C-12**	➢ to acquaint the students with basic concepts used in cost accounting. ➢ to make aware of various methods in cost X Ray cost accounting book keeping systems. ➢ to provide knowledge of relevant Indian accounting standards in line with IFRS and how the standards would became applicable.

BC 2.6	E-Commerce	Skill Enhancement Elective Course -2	➢ to enable the students to become familiar with the mechanism for conducting business transactions through electronic means. ➢ awareness regarding IT Act 2000 and Cyber crimes. ➢ practical knowledge of website designing, E-payment system and online business transactions

THIRD YEAR			
COURSE CODE	**COURRSE TITLE**	**NATURE OFF COURSE**	**COURSE OUTCOMES**
BC 3.1(a)	**Human Resource Management**	**DSE-1(a)**	➢ this course aims to acquaint students with the techniques and principles to manage human resource of an organization. ➢ to acquire right man for the right job at right time (i.e. from recruitment till separation).
BC 3.1(b)	**Principles of Marketing**	**DSE-1(b)**	➢ to impart basic knowledge of concepts principles Tools and techniques of marketing. ➢ to have knowledge about 4 piece in product pricing placement and promotion of goods and services. ➢ to know about recent development in marketing in that is online marketing Green Marketing etc.
BC 3.1(c)	**Fundamentals of Financial Management**	**DSE-1(c)**	➢ it aims to familiarize students with the principles and practice of financial management ➢ to impart knowledge of investment decision financing decision that is raising of funds, utilization and its distribution.
BC 3.2 (a)	**Corporate Governance And Auditing**	**DSE-2(a)**	➢ it aims to provide knowledge of auditing principles procedures and techniques in accordance with current legal recruitment and professional standards. ➢ to give an overview of the principle of corporate governance and CSR corporate social responsibility
BC 3.2 (b)	**Goods And Service Tax (GST)**	**DSE-2(b)**	➢ It aims to provide basic knowledge and equip students with application of principles and provisions of GST
BC. 3.3	**Entrepreneurship**	**Skill Enhancement Elective Course- 3**	➢ it aims to orient the learner towards entrepreneurship as a career option and creative thinking and behaviour. ➢ mobilizing resources for startups

ECONA-313	**Economy of Himachal Pradesh**	**Generic Elective-1**	➢ This course highlights the basic features, characteristics and developmental issues of economy of Himachal Pradesh .
BC 3.5 (a)	**Corporate Tax Planning**	**DSE-3(a)**	➢ to impart basic knowledge of corporate tax planning and its impact on discussion making, corporate tax in India, tax evasion, tax avoidance. ➢ to plant tax with reference to setting up a new business or different aspects that is nature science scope of business.
BC 3.5(b)	**Banking and Insurance**	**DSE- 3(b)**	➢ the purpose is to import knowledge about the basic principles of Banking and Insurance. ➢ to know about banking landing process, Internet banking, e-payment, ATM, cards debit, credit card, NEFT, RTGS, e-money, electronic purse, digital cash etc. ➢ to have knowledge about risk bearing Agencies role of IRDA, online insurance.
BC 3.5(c)	**Management Accounting**	**DSE-3(c)**	➢ to provide knowledge about the use of Finance cost and other data for the purpose of managerial planning, control and decision making.
BC 3.5(d)	**Computerized Accounting system**	**DSE-3(d)**	➢ aims to enhance the skills needed for computerized accounting system and to enable the student to develop simple accounting applications
BC 3.6(a)	**International Business**	**DSE-4(a)**	➢ the objective is to familiarize with the concepts importance and dynamics of international business and India's involvement with Global Business. ➢ it seeks to provide the theoretical foundations of international business to the extent that these are relevant to the Global business operation and development. ➢ it provides knowledge regarding International organizations (like WTO, UNCTA, OPEC) International Financial environment (IMF) ,World Bank etc.
BC 3.6 (b)	**Office Management And Secretarial Practics**	**DSE-4(b)**	➢ aim of this course is to familarrize the students with the activities in a modern office. ➢ Smooth functioning of any organization depends upon the way various activities are organized, facilities provided to the staff working in the office, the working environment and the tools and equipment used in office.

BC 3.6 (c)	**Fundamentals of Investment**	**DSE-4(c)**	➢ to familiarize with different investment alternatives introduction introduce them to the framework of their analyses and valuation. ➢ to highlight the role of investor protection rule of SEBI as regulating authority
BC 3.6 (d)	**Consumer Protection**	**DSE-4(d)**	➢ to familiarize students with their rights as a consumer the social frame of consumer rights and legal frame of protecting consumer rights. ➢ to provide an understanding of the procedure of redressal of consumer complaint and rule of different agencies in establishing product and service standards. ➢ it enables the students to comprehend the business forms with consumers and the consumer related regulatory and business environment. ➢ knowledge of the consumer protect act 1986 (CPA) and other adjudicatory bodies. customer Movement in India
BC 3.7	**Personal Selling and Salesmanship**	**Skill Enhancement Elective Core Course-4**	➢ the purpose is to familiarize the students with the fundamentals of personal selling and its process. ➢ to understand selling as a career and what it takes to be a successful salesman to arouse interest of desired consumers and to take action.
ECONA-314	**Indian Economy**	**Generic Elective-2**	➢ it seeks to enable the students to grasp the major economic problems in India and their solution. ➢ to provide an understanding of modern tools of macroeconomics analyses and political and policy framework. ➢ to enable the students to understand sectoral Trends and issues, inflation, unemployment and Labor markets

PROGRAMME OUTCOME

The B.Com (pass course) provides an outcome in terms of following aspects;

1. it gives an opportunity to the students to go for the professional courses like CA, ICWA, CS, Banking, Insurance, Logistics, Business Administration, marketing etc.

2. it provides a base to pursue higher education that is Masters Degree and Research.

3. with this the student becomes acquaint with different practical practicing and actual aspects like computer application software that is Tally (Standardized) and customized, filling of various returns online as well as offline, Computer aided auditing etc.

4. it prepares the students professionally to take various activities in various Industries.

5. the course creates confidence in the students which in turn make them capable of development of their personality and decision makers

Course Outcome (co's)

BC 1. Financial Accounting (Core Course C-1)

The objective of this paper is to help students to acquire conceptual knowledge of accounting,
Financial statements of different business organization.
To impart skills for recording various kinds of business transactions and to follow accounting standards in India and at international level.
Practical knowledge of Tally.

BC 1.2 Business Organization and Management (Core Course C-2)

The course aims to provide basic knowledge about business organizations and management of business Enterprises.
emerging opportunities in business like franchising Outsourcing e-Commerce.
technological innovations and skill development make in India Movement and functional areas of management like marketing management, human resource management, financial management etc.

BC 1.3 Business Law (Core Course C-4)

to impart basic knowledge of important business legislation that is Indian Contract Act sales of good goods act Indian Partnership Act Negotiable Instrument Act to make law to make aware of legal aspects with relevant case law.

BC 1.4 Business Statistics and Mathematics (Core Course C-5)

to familiarize students with the application of mathematics and Statistical Techniques in business decision making.
how to collect edit classify, analyze and interpret data and its application.

SECOND YEAR

B C 2.1Company Law (Core Course C-7)

to impart basic knowledge of the provisions of the Companies Act 2013.
to make aware regarding incorporation of company its registrations management Administration and winding up.
emerging issues in company like CSR corporate social responsibility meeting through video conferencing, e-voting.
case studies involving issues in company law.

BC 2.2 Income Tax Law and Practice (Core Course C-8)

to equip students with applications of principles and provisions of income tax 1961 and the relevant rules.
to provide basic knowledge of assessment of income under various heads like salary us property profit and gains of business, capital gains, income from other sources.
practical knowledge of e filing that is online filing of returns of income tax and TDS.

BC 2.3 Computer Applications in Business(Skill Enhancement Elective course -1.)

to provide computer skills and knowledge of computer working processing creating business document splitting business spreadsheet.
to announce the students understanding of usefulness information usefulness of Information Technology tools for business operations.

B C 2.4 Corporate Accounting (Core Course C-11)

to enable the students to acquire the bass Gulab required required the basic knowledge of the corporate accounting.
to learn the techniques of preparing the financial statements of company holding companies banking companies.
preparation of cash flow statement as per Indian Accounting Standard(Ind-AS3)

BC 2.5 Cost Accounting (Core Course C-12)

to acquaint the students with basic concepts used in cost accounting.
to make aware of various methods in cost X Ray cost accounting book keeping systems.
to provide knowledge of relevant Indian accounting standards in line with IFRS and how the standards would became applicable.

BC 2.6 E-Commerce (Skill Enhancement Elective Course -2)

to enable the students to become familiar with the mechanism for conducting business transactions through electronic means.
awareness regarding IT Act 2000 and Cyber crimes.
practical knowledge of website designing, E-payment system and online business transactions.

THIRD YEARR

BC 3.1(a) Human Resource Management (DSE-1(a))

This course aims to acquaint students with the techniques and principles to manage human resource of an organization.

to acquire right man for the right job at right time (i.e. from recruitment till separation).

BC 3.1(b) Principles of Marketing (DSE -1(b))

To impart basic knowledge of concepts principles Tools and techniques of marketing.

To have knowledge about 4 piece in product pricing placement and promotion of goods and services.

To know about recent development in marketing in that is online marketing Green Marketing etc.

BC 3.1 (c) Corporate Governance And Auditing (DSE-1(c)

It aims to provide knowledge of auditing principles procedures and techniques in accordance with current legal recruitment and professional standards.

To give an overview of the principle of corporate governance and CSR corporate social responsibility

BC 3.2 (a) Fundamentals of Financial Management (DSE-2(a))

it aims to familiarize students with the principles and practice of financial management.

to impart knowledge of investment decision financing decision that is raising of funds, utilization and its distribution.

BC 3.2 (b) Goods And Service Tax (GST)(DSE-2(b))

It aims to provide basic knowledge and equip students with application of principles and provisions of GST

BC. 3.3 Entrepreneurship (Skill Enhancement Elective Course- 3)

It aims to orient the learner towards entrepreneurship as a career option and creative thinking and behaviour.

mobilizing resources for startups

BC 3.4 Principles of Microeconomics (Generic Elective-1)

Get basic knowledge of determinants of demand and supply and its applications until I'm sorry utility theory.

to make equilibrium in the firm due to technological change functional distribution of income

BC 3.5 (a) Corporate Tax Planning (DSE-3(a))

To impart basic knowledge of corporate tax planning and its impact on discussion making, corporate tax in India, tax evasion, tax avoidance.

to plant tax with reference to setting up a new business or different aspects that is nature science scope of business.

BC 3.5(b) Banking and Insurance(DSE- 3(b))

The purpose is to import knowledge about the basic principles of Banking and Insurance.

to know about banking landing process, Internet banking, e-payment, ATM, cards debit, credit card, NEFT, RTGS, e-money, electronic purse, digital cash etc.

to have knowledge about risk bearing Agencies role of IRDA, online insurance.

BC 3.5(c) Management Accounting (DSE-3(c))

To provide knowledge about the use of Finance cost and other data for the purpose of managerial planning, control and decision making.

BC 3.5(d) Computerized accounting system (DSE-3(d) Aims to enhance the skills needed for computerized accounting system and to enable the student to develop simple accounting applications

BC 3.6(a) International Business (DSE-4(a)

The objective is to familiarize with the concepts importance and dynamics of international business and India's involvement with Global Business.

It seeks to provide the theoretical foundations of international business to the extent that these are relevant to the Global business operation and development.

it provides knowledge regarding International organizations (like WTO, UNCTA, OPEC) International Financial environment (IMF) ,World Bank etc.

BC 3.6(b) Office Management And Secretarial Practics DSE-4(b)

Aim of this course is to familarrize the students with the activities in a modern office. Smooth functioning of any organization depends upon the way various activities are organized, facilities provided to the staff working in the office, the working environment and the tools and equipment used in office.

BC 3.6 (c) Fundamentals of Investment (DSE-4(c))

To familiarize with different investment alternatives introduction introduce them to the framework of their analyses and valuation.

To highlight the role of investor protection rule of SEBI as regulating authority.

BC 3.6 (d)Customer Protection (DSE-4(d))

To familiarize students with their rights as a consumer the social frame of consumer rights and legal frame of protecting consumer rights.

To provide an understanding of the procedure of redressal of consumer complaint and rule of different agencies in establishing product and service standards.

it enables the students to comprehend the business forms with consumers and the consumer related regulatory and business environment.
Knowledge of the consumer protect act 1986 (CPA) and other adjudicatory bodies.
customer Movement in India

BC 3.7Personal Selling and Salesmanship (Skill Enhancement Elective Core Course-4)
the purpose is to familiarize the students with the fundamentals of personal selling and its process.
to understand selling as a career and what it takes to be a successful salesman to arouse interest of desired consumers and to take action.

BC 3.8 Indian Economy(Generic Elective-2)
It seeks to enable the students to grasp the major economic problems in India and their solution.
To provide an understanding of modern tools of macro economics analyses and political and policy framework.
To enable the students to understand sectoral Trends and issues, inflation, unemployment and Labour markets

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ECONOMICS				
Sr. No.	**Year**	**Course Code**	**Course Outcomes**	**Course Outcome**
1	1st	ECONA 101	Principles of Micro Economics-I	This course provides basic knowledge of microeconomics concepts. The students learn the relationship among different variables in various theories related to consumption and production at micro level.
		ECONA 102	Principles of Micro Economics-II	In this course, students will learn about different market forms and factor prices.
2	2nd	ECONA 201	Principles of Macro Economics-I	This course provides the knowledge regarding various economic issues at macro level, such as National Income, Employment etc. Students will also learn about Monetary economics
		ECONA 202	Principles of Macro Economics-II	The course is expected to develop skill in economic reasoning which help them in understanding and solving economic problems at aggregate level.
3	3rd	ECONA 305	Development Economics	The students will get the knowledge about economic growth and economic development of the economy.
		ECONA 301	Indian Economy	The students will acquire knowledge about colonization impact on our Indian Economy. They know about the significance of planned economy. The students become able to understand the issues and prospects of Indian Economy.
Skill Enhancement Courses (SEC)				
4	2nd	ECONA 203	Statistical Methods - I & II	the students will acquire statistical knowledge, this will help them for the further studies.
5	3rd	ECONA - 310	Public Finance	This course will be helpful in making their career in Government Sector, policy analysis & Journalism.
		ECONA - 311	Money & Banking	Students will learn the role of Banks in credit creation and credit control.
Generic Elective Course (GEC)				
6	3rd	ECONA 313	Economy of Himachal Pradesh	This course will enable the students to get depth knowledge about natural resources, agriculture, Industrial and Tourism of Himachal Pradesh. This will help in their competative examination.
		ECONA - 314	Indian Economy	The students will acquire knowledge about colonization impact on our Indian Economy. They know about the significance of planned economy. The students become able to understand the issues and prospects of Indian Economy.

YEAR	PAPER CODE	COURSE NAME	COURSE OUTCOMES
I	ENG CE101	English-1 Core English **(Compulsory)** for B.A. and B.Com. I Year	• ***AT THE END OF THE YEAR STUDENTS SHOULD HAVE THE FOLLOWING:*** • Should be able to understand variety of rhetorical modes. • Should have an ability to read, listen, comprehend, summarise and draw inferences. • Should be able to understand the correct pattern of the language. • Students must understand the importance of the articles, prepositions and verb forms that influence language, speech and writing. • Should develop a habit to learn new words/phrases to increase their vocabulary.
I	ENG DSC102 /ENG HONS GE 101	DSC-1A English Literature-I (Essays, Stories and Poems) (**Core Course for students who choose English as Discipline)**	• Should be able to recognize and analyse any short story, poem and essay critically and analytically. • Should be able to analyse the understated experiences and cultural diversity along with the issues of the aborigines, race, gender, class, sexuality and ethnicity. • Should develop an ability to identify common structural and thematic features of any text. • Should develop an ability to recognize text's elements such as style, form, images, figures of speech, connotations and references. • Should develop an understanding of some generally used literary terms.
I	ENG DSC103/ ENG HONS GE 102	DSC-1B English Literature-2 (Poems, Short-Stories and Essays) **(Core Course for students who choose English as Discipline)**	• Should develop an ability to understand the different and distinct forms of language pluralities (power of language and politics of language). • Should be able to apply different critical, theoretical and philosophical approaches to variety of stories, poems and essays. • Should develop an ability to recognize text's elements such as style, form, images, figures of

			speech, connotations and references. • Student must develop an ability to understand and accept a composite view of multiculturalism. • Should be able to build vocabulary and knowledge of literary terminology. • Should develop an ability to identify common structural and thematic features of any story, poem and essay.
I	ENG AECC104	AECC-2 Writing Skills (for B.A., B.Com. and B.Sc. I Year students)	• Should have an ability to read, listen, comprehend, summarise and draw inferences. • Should have much needed professional communication skills such as report writing, letter writing, taking notes, reporting of events and happenings etc. • Should develop an ability to write logically, clearly and effectively for a variety of professional and social settings • Should learn to incorporate stylistic elements to horn and enhance communication skills
II	ENG CE 201	English-2 (Core English **(Compulsory)** for B.A. & B.Com. II Year	• Should have an ability to read, listen, comprehend, summarise and draw inferences. • Should be able to understand variety of rhetorical modes. • Should be able to understand the correct pattern of the language. • Should understand usage of one word substitution, Nouns and Verbs that influence language, speech and writing. • Should develop a habit to learn new words/phrases to increase vocabulary.
II	ENG DSC 202 /ENG HONS GE 203	DSC 1-C British Literature (Play and Novel)	• Should be able to apply different critical, theoretical and philosophical approaches • Should develop an ability to recognize text's elements such as style, form, images, figures of speech, connotations and references. • Student must develop an ability to understand

			human psychology through the study of different characters which facilitates social adaptability and understanding. • Should be able to build vocabulary and knowledge of literary terminology. • Should understand the literary concepts and elements of comedy and especially the "Romantic Comedy." • Should develop an ability to peep into the psyche of the characters for the better understanding of human beings in general.
II	ENG DSC203 /ENG HONS GE 204	DSC-1D Literary Cross Currents Modern Indian Literature	• Should develop an ability to recognize text's elements such as style, form, images, figures of speech, connotations and references. • Should be able to build vocabulary and knowledge of literary terminology. • Should be able to apply different critical, theoretical and philosophical approaches to variety of stories, poems and essays. • Student must develop an ability to understand and accept a composite view of multiculturalism. • Should develop an ability to identify common structural and thematic features of any story, poem and essay. • Should have an ability to analyse the variety of literary forms in term of styles, language, conventions, themes and social cultural diversities. • Should learn the elements of narration and composition to substantiate the communicative skills.
II	ENG AEEC/SEC204	AEEC/SEC-1: Creative Writing, Book and Media Reviews	• Should understand the process of creativity. • Should learn to apply art and craft of creative writing. • Learn to maintain objectivity in writing. • Should build an ability to write small poems,

			compositions on day to day experiences. • Should have an ability to read, listen, comprehend, summarise and draw inferences. • Should create scopes for employability in the fields like blogging, editing, creative writing, newspaper reporting etc. • Should understand the importance of process and principles of writing such as unity, objectivity, support, coherence etc.
II	ENG AEEC/SEC205	AEEC/SEC-2: Translation Studies and Principles of Translation **(**Basic Concepts and Readings)	• Should develop an insight into the structure and pattern of English language. • Students should be able to understand principals of translation. • Should be able to see through the problems and politics of translations. • Should understand the types and methods of translation: sense based translation, word-to-word translation, imitations and adaptation etc. • Should be able to translate literary / non-literary passages from their mother tongue into English and vice-versa. • Should learn to display a working knowledge of translation to seek employability as an interpreter or a translator.
	ENG AEEC/SEC301	AEEC/SEC-3: Technical Writing	• Should be able to write coherently and clearly. • Should be able to write formal and informal reports and presentations. • Should develop and improve their communication skills such as they should be able to communicate their ideas, suggestions, views and opinions clearly and logically. • Should have strong vocabulary. • Should learn the skills of selecting topics and how to write thesis introduction. • Should develop knowledge of scientific and technical subjects to write formal and informal

			technical compositions. • Should learn to write proceedings and minutes of the meetings etc.
	ENG AEEC/SEC302	AEEC/SEC-3: Business Communication	• Should be able to use proper format for different kinds of written business communications • Should be able to write coherent, clear, logical and correct letters • Should be able to write formal and informal reports and presentations. • Should develop and improve their communication skills
	ENG DSC303	DSE –1 A: Soft Skills	• Should develop and improve their communication skills such as they should be able to communicate their ideas, suggestions, views and opinions clearly and logically. • Should develop leadership qualities through strong communication skills and ability to influence with humility. • Should understand the basic techniques of solving a problem. • Should develop social adaptability skills. • Should understand the importance and characteristics of emotional intelligence such as taking responsibility for their actions. • Should learn to read visual texts like graphics / cartoons etc.
	ENG DSC304	DSE-1B Academic Writing and Composition	• Should be able to write coherently and clearly. • Should be able to write formal and informal reports and presentations. • Should develop and improve their communication skills such as they should be able to communicate their ideas, suggestions, views and opinions clearly and logically. • Should have strong vocabulary • Should be able to use exact, correct, and proper words or terms along with error free writing

			skills.
	ENG GE 305	GE-1 Literature from Himachal Textbook under Preparation by the Department of HP University, Shimla	• Should be able to apply different critical, theoretical and philosophical approaches in context of Himachal Pradesh. • Should develop an ability to recognize text's elements such as style, form, images, figures of speech, connotations and references. • Student must develop an ability to understand human psychology through the study of different characters which facilitate social adaptability and understanding. • Should be able to see through the issues, themes and the politics in context of H.P.
	ENG GE 306	GE-2 Contemporary India: Women and Empowerment	• Should be sensitive to gender issues. • Should learn social constructions of genders in India and across the world. • Should understand the interdisciplinary approaches to gender sensitive issues. • Should understand the issues related to feminism. Should be able to build vocabulary and have knowledge of literary terminology.

'हिन्दी'

भाषा भावाभिव्यक्ति एवं विचार विनिमय का साधन है । भाषा ज्ञान व भाषायी कौशल को प्राप्त किए बिना व्यक्ति अपने भाव, विचार व मनोभावों की अभिव्यक्ति सफलता पूर्वक नहीं कर पाता है। मात्र अक्षर ज्ञान से ही भाषायी कौशल को प्राप्त नहीं किया जा सकता है। आधुनिक युग शिक्षा में क्रान्ति का युग है, कला संकाय में भाषा वर्ग भी इससे अछूता नहीं रहा है। 1976 में महाविद्यालय की स्थापना के समय से ही कला संकाय के अन्तर्गत हिन्दी का मुख्य विषय के रूप में अध्यापन करवाया जा रहा है जिसे साहित्यिक अभिरूचि रखने वाले विद्यार्थी विषय के रूप में पढ़ते थे। धीरे-धीरे राष्ट्र भाषा हिन्दी के प्रचार प्रसार और जीवन में आनेवाली भाषिक समस्याओं को देखते हुए दूसरे संकायों में भी इसे अनिवार्य विषय के रूप में पढ़ा कर जहां एक ओर उन्हे भाषायी कौशल प्रदान किया गया वही दूसरी ओर प्रतियोगी परीक्षाओं के लिए भी तैयार किया जाने लगा। फलस्वरूप यह विषय अब विज्ञान और वाणिज्य संकायों के साथ अन्तर्सम्बिन्धत हो चुकी है ।वर्तमान समय में राष्ट्रीय उच्चतर शिक्षा अभियान के अन्तर्गत अखिल भारतीय स्तर पर शिक्षा के स्तर व गुणवत्ता को ध्यान में रखते हुए और पाठ्यक्रम में सम्पूर्णता लाने के लिए हिमाचल प्रदेश विश्वविद्यालय ने 2018-2019 सत्र से विश्वविद्यालय अनुदान आयोग के अनुरूप बी.ए. (हिन्दी) का नवीन पाठ्यक्रम तैयार किया है जिसमें मुख्य विषय हिन्दी के प्रश्न-पत्रों की सामग्री निर्धारण में ज्ञान व शिक्षा के बदलते परिप्रेक्ष्य को ध्यान में रखा गया है । पारस्परिक एवं शास्त्रीय विषयों के साथ-साथ जो विषय आधुनिक पीढ़ी के लिए उपयोगी तथा रोचक है,उनका समावेश पाठ्यक्रम में किया गया है। वैकल्पिक विषय लोक साहित्य, भारतीय साहित्य, पत्रकारिता, रचनात्मक लेखन, अनुवाद विज्ञान आदि से विद्यार्थी में ज्ञान की अभिवृद्धि वैश्वीकरण के सन्दर्भ में प्रासंगिकता और उपयोगिता सिद्ध करती है। साहित्य के छात्र के समुचित व सर्वागींण विकास को ध्यान में रखते हुए साहित्य की विविध मुखी विधाओं(कविता, नाटक, उपन्यास, निबन्ध, कहानी, काव्यशास्त्र) का समायोजन इस पाठ्यक्रम में किया गया है । अनिवार्य हिन्दी, कार्यालयी हिन्दी, हिन्दी भाषा व सम्प्रेषण जैसे विषयों का अध्यापन करवाकर साहित्येत्तर विद्यार्थियों में ज्ञानवर्द्धन, भाषायी क्षमता व दक्षता में अभिवृद्धि करवाना,

इस पाठ्यक्रम का लक्ष्य है।

कार्यक्रम परिणाम (PROGRAMME OUTCOME):-

स्नातक स्तर पर हिन्दी विषय में तीन वर्ष अध्ययन करने के पश्चात् विद्यार्थी :-

1. हिन्दी साहित्य का ज्ञान प्राप्त कर सकेंगे ।
2. बौद्धिक, मानसिक, भाषिक विकास को प्राप्त कर सकेंगे ।
3. भाषायी कौशल को प्राप्त करने में सक्षम बनेंगे ।
4. साहित्य की विभिन्न विधाओं का अध्ययन कर जीवन के विभिन्न पहलुओं को समझ पाने में सामर्थ्य प्राप्त कर सकेंगे ।
5. सृजनात्मक लेखन के प्रति प्रेरित होगें।
6. मनोभावों व सम्वेदनाओं को जागृत कर पाएंगे और समाज के साथ जुड़ पाने में समर्थ बनेंगे ।
7. जीवन के विविध पहलुओं, नैतिक मूल्यों, जीवन मूल्यों, आदर्शो को समझ कर, जीवन में ढाल कर समाज के प्रति कर्तव्य निष्ठ बन पाएंगे।
8. साहित्यकारों, लेखकों के जीवन व लेखन से प्रभावित होकर स्वतन्त्र लेखन के लिए प्रेरित होंगे।
9. हिन्दी भाषा, व्याकरण, भाषा विज्ञान का सम्यक् ज्ञान प्राप्त कर पाएंगे और व्यावहारिक प्रयोग करने

में समर्थ होंगे ।

10. भावों, विचारों, सम्वेदनाओं को सम्प्रेषित कर पाएंगे ।

Distribution of Marks and Teaching Hours

Sr. No.	Type of Paper	Max. Marks	Internal Assessment	Year End Examination	Teaching per weak (each lecture/tutorials of one hours)	Credits
1.	Core	100	30	70	3 Lectures	06
2.	Elective	100	30	70	3 Lectures	06
3.	Ability Enhancement	100	30	70	2 Lectures	04
4.	Skill Enhancement	100	30	70	2 Lectures	04

2018-2019 से आरम्भ परीक्षा योजना व निर्धारित पाठ्यक्रम।

प्रथम वर्ष

Year	Course Code	Course	Course Type	Course Name	Credits	Award Type
1		English - 1	Core Course		06	100 YEE=70 IA =30
	HIND101	SKT/ HINDI-I	Core Course B.A./B.Com.	प्रयोजनमूलक हिन्दी	06	100 YEE=70 IA =30
	HIND102	DSC-1A	Core Course	हिंदी साहित्य का इतिहास	06	100 YEE=70 IA =30
	HIND103	DSC – IB	Core Course	मध्यकालीन हिंदी कविता	06	100 YEE=70 IA =30
		DSC – 2A	Core Course		06	100 YEE=70 IA =30
		DSC – 2B	Core Course		06	100 YEE=70 IA =30
		AECC - I	Ability Enhancement Compulsory Course	Environment Studies	04	100 YEE=70 IA =30
	HIND104	AECC – 2 Hindi/Eng./ Skt(One out of three)	Ability Enhancement Compulsory Course	हिंदी भाषा और संप्रेषण	04	100 YEE=70 IA =30
		Total			**44**	

द्वितीय वर्ष

Year	Course Code	Course	Course Type	Course Name	Credits	Award Type
2		English - 2	Core Course		06	100 YEE=70 IA =30
	HIND201	SKT/ HINDI-2	Core Course B.A./B.Com.	अनिवार्य हिन्दी 'रचना पुंज'	06	100 YEE=70 IA =30
	HIND202	DSC – IC	Core Course	आधुनिक हिंदी कविता	06	100 YEE=70 IA =30
	HIND203	DSC – ID	Core Course	हिंदी गद्य साहित्य	06	100 YEE=70 IA =30
		DSC – 2C	Core Course		06	100 YEE=70 IA =30
		DSC – 2D	Core Course		06	100 YEE=70 IA =30
	HIND204 HIND205	SEC - I	Skill Enhancement Course	कार्यालयी हिन्दी अथवा हिंदी भाषा शिक्षण	04	100 YEE=70 IA =30
	HIND206 HIND207	SEC - 2	Skill Enhancement Course	अनुवाद विज्ञान अथवा संभाषण कला	04	100 YEE=70 IA =30
		Total			**44**	

तृतीय वर्ष

Year	Course Code	Course	Course Type	Course Name	Credits	Award Type
3	HIND301 HIND302	SEC – 3	Skill Enhancement Course	रंग आलेख एवं रंगमंच अथवा भाषा कम्प्यूटिंग	04	100 YEE=70 IA =30
	HIND303 HIND304	SEC – 4	Skill Enhancement Course	चलचित्र लेखन अथवा समाचार संकलन और लेखन	04	100 YEE=70 IA =30
	HIND305	DSE – 1A	Discipline Specific Elective	लोक साहित्य	06	100 YEE=70 IA =30
	HIND306	DSE – 1B	Discipline Specific Elective	छायावादोत्तर हिंदी कविता	06	100 YEE=70 IA =30
		DSE – 2A	Discipline Specific Elective		06	100 YEE=70 IA =30
		DSE – 2B	Discipline Specific Elective		06	100 YEE=70 IA =30
	HIND307	GE - 1	Generic Elective	आधुनिक भारतीय साहित्य	06	100 YEE=70 IA =30
	HIND308	GE - 2	Generic Elective	सर्जनात्मक लेखन के विविध क्षेत्र	06	100 YEE=70 IA =30
		Total			**44**	

HIND101	Core Course B.A./B.Com.	प्रयोजनमूलक हिन्दी	1. साहित्य व साहित्येत्तर छात्र भाषायी कौशल प्राप्त कर पाएंगे।

			2. प्रतियोगी परीक्षाओं के लिए स्वयं को तैयार कर पाएंगे। 3. कार्यालयी पत्र व्यवहार का परिचय व प्रयोग समझ पाएंगे। 4. शब्द ज्ञान, शब्दों के शुद्ध प्रयोग, शब्द भंडार व पारिभाषिक शब्दों के द्धारा अपने शब्द भंडार को समृद्ध कर पाएंगे
HIND102	DSC-1A Core Course	हिन्दी साहित्य का इतिहास	इस विषय का अध्ययन विद्यार्थी को आग्रिम पाठ्यक्रम व साहित्य को पढ़ने के लिए आधार भूमि प्रदान करेगा 1. हिन्दी इतिहास को काल-विभाजन, नामकरण, इतिहास लेखन परम्परा को समझ पाएगा। 2. काल विशेष की समसामयिक परिस्थितियों को समझ कर साहित्य, साहित्यकार व उनकी रचनाओं को समझ पाएगा। 3. काल विशेष की विभिन्न धाराओं का पूर्ण परिचय प्राप्त कर पाएगा । 4. आधुनिक काल में पद्य के साथ गद्य लेखन विकास व परम्परा से परिचित हो पाएगा।
HIND103	DSC - IB Core Course	मध्यकालीन हिन्दी कविता	1. मध्यकालीन कवियों, रीति कालीन कवियों के जीवन, परिस्थितियों, लेखन कला को समझकर उनकी कविताओं को समझ पाएंगे। 2. शब्दों को प्रयोग, अर्थ, व्याख्या, भावार्थ और काव्य के कलात्मक गुणों की परख कर पाएंगे। 3. कवियों के भावों, सिद्धान्तों, सम्वेदनाओं को समझ पाएंगे। 4. काव्य में व्यक्त रसों का आस्वादन कर पाने के योग्य बनेंगे।
HIND104	AECC-2	हिन्दी भाषा एवं संप्रेषण	1. हिन्दी भाषा की प्रकृति, विविध रूपों को समझ पाएंगे। 2. वर्णव्यवस्था, उच्चारण स्थान समझकर शुद्ध बोलना, लिखना तथा उच्चारण करना सीख पाएंगे। 3. भाषायी कौशल को प्राप्त कर भावार्थ, व्याख्या, आशय व पत्र लेखन में सक्षम बन पाएंगे।
HIND201		अनिवार्य हिन्दी	1. इस पाठ्यक्रम को पढ़ने के पश्चात् साहित्येत्तर विद्यार्थी हिन्दी भाषा और हिन्दी साहित्य से

			विस्तृत परिचय प्राप्तकर पाएगा। 2. विविध कवियों, कहानिकारों व निबन्ध लेखकों की लेखन शैली से परिचित हो विचारों की अभिव्यक्ति की कला सीख पाएगा। 3. कविता, कहानी, निबन्ध का अन्तर, भावों की अभिव्यक्ति का तरीका और अर्थ ग्रहण कर उसे अभिव्यक्त करने में सक्षम हो पाएगा । 4. भाषायी क्षमता व दक्षता में अभिवृद्धि कर पाएगा।
HIND 202	DSC	आधुनिक हिन्दी कविता	1. भारतेन्दु युगीन, छायावादी, प्रयोगवादी कवि और उनकी परम्परा को समझ उनका तुलनात्मक अध्ययन कर पाएंगे। 2. कवियों की कविता की व्याख्या व भावार्थ कर पाने में सक्षम होंगे। 3. कवियों की कविता की भाषा, छंद, अलंकार के गुणों को समझकर शब्दों के विविध प्रयोग को समझ पाएंगे । 4. कवियों की लेखन शैली का तुलनात्मक अध्ययन कर पाएंगे। 5. कविताओं में छिपे भावों, सम्वेदनाओं, कारणों, मूल्यों को पहचानने में सक्षम हो पाएंगे ।
HIND203	DSC	हिन्दी गद्य साहित्य	1. गद्य साहित्य के इस पाठ्यक्रम को पढ़कर विद्यार्थी शब्द ज्ञान, वाक्य रचना, लेखन की विभिन्न शैलियों का ज्ञान प्राप्त करेगा । 2. उपन्यास, कहानी, निबन्ध द्वारा परिवेश, जीवन मूल्य, समाज, संस्कृति, समकालीन परिदृश्य को बेहतर समझ पाएगा। 3. उनमें बोध अभिव्यक्ति दोनों शक्तियों का विकास होगा । 4. विद्यार्थी में स्वअध्ययन की प्रवृति जागृत होगी । 5. कहानी व उपन्यास में व्यक्त पात्रों के साथ सहसम्बन्ध स्थापित कर वस्तुस्थिति को समझ पाएगा ।
HIND 204	SEC-I	कार्यालयी हिन्दी	1. हिन्दी भाषा के विभिन्न रूपों का ज्ञान प्राप्त कर उनमें अन्तर समझ पाएंगे। 2. कार्यालयी कामकाज में प्रयुक्त होने वाले विभिन्न रूपों से परिचित हो व्यावहारिक रूप में कार्यालयी कामकाज व तरीकों को समझ पाएंगे।

			3. तकनीक विकास के अनुसार कार्यालय में प्रयोग होने वाले यन्त्रों से परिचित हो पाएंगे और उनकी कार्य प्रणाली को समझ पाएंगे। 4. भाषायी दक्षता के साथ-साथ राजभाषा हिन्दी की व्यावहारिक कठिनाइयों को समझ पाएंगे।
HIND 205	SEC-I	हिन्दी भाषा शिक्षण	1. इस विषय को पढ़ने के पश्चात् विद्यार्थी शुद्ध, सरल, स्पष्ट, प्रभावशाली ढंग से भावों की अभिव्यक्ति और शिक्षण में कुशल बन पाएंगे। 2. भाषा शिक्षण की विधियों से मौखिक व लिखित भाषा के माध्यम से भावों को ग्रहण करने में सक्षम होंगे । 3. भाषायी कौशल (श्रवण, वचन, लेखन, पठन) में दक्ष हो पाएंगे। सौन्दर्य बोध द्वारा अपनी अभिवृतियों का विकास कर पाएंगे। 4. सौन्दर्य बोध द्वारा अपनी अभिवृतियों का विकास कर पाएंगे।
HIND206	SEC-2	अनुवाद विज्ञान	1. इस पाठ्यक्रम को पढ़ने के पश्चात् विद्यार्थी अनुवाद की आवश्यकता, प्रकार और प्रमुख रूपों का ज्ञान प्राप्त कर पाएंगे। 2. अनुवाद विज्ञान के विभिन्न पहलुओं को समझ पाएंगे। 3. अनुवाद की आवश्यकता समझ, सफल अनुवादक के गुण, क्षमताओं का विकास करने के लिए प्रेरित हो पाएंगे। 4. व्यावहारिक तौर पर अनुवाद का कार्य करने के लिए प्रेरित होगें।
IND207	SEC-2	संभाषण कला	1. यह विषय आधुनिक पीढ़ी व समय की मांग के अनुसार विद्यार्थी को तैयार होने का आधार प्रदान करेगा। 2. वाचन कला के विविध आयामों से परिचित करवाएगा। 3. विद्यार्थी वाचन कला के गुणों व विशेषताओं के महत्व को समझ, आत्मसात करेगें। 4. जनसम्पर्क, मास मीडिया, मल्टी मीडिया के क्षेत्र में रूचि के अनुरूप आजीविका के साधन प्राप्त करने की योग्यता प्राप्त करने में सफल हो पाएंगे। 5. वाचन कला में दक्षता प्राप्त कर पाएंगे।

HIND301	SEC-3	रंग आलेख एवं रंगमंच	1. इस पाठ्यक्रम का अध्ययन करने के पश्चात् विद्यार्थी, नाटक, उसके विभिन्न प्रकार, हिन्दी नाट्यशास्त्र, नाट्य-लेखन के इतिहास का सम्पूर्ण ज्ञान प्राप्त कर पाएगा। 2. हिन्दी के प्रमुख नाटक व नाटककारों को पढ़कर नाटक के तत्वों के महत्व को समझ पाएगा । 3. रंगमंच से जुड़ी बारीकियों को समझ पाएगा । 4. रंगमंच के विविध पहलुओं जैसे संवाद लेखन, पटकथा लेखन, ध्वनि व्यवस्था, प्रसाधन आदि में विशेषज्ञता हासिल करने की आधार भूमि को प्राप्त कर पाएगा।
HIND302	SEC-3	भाषा कम्प्यूटिगं	1. सूचना प्रौद्धिोगिकी में समय की मांग के अनुरूप कम्प्यूटर के प्रयोग की आवश्यकता को समझेगा। 2. मल्टी मीडिया की कार्य प्रणाली को समझ पाएगा । 3. वैश्वीकरण और तकनीक के सन्दर्भ में अपने ज्ञान की अभिवृद्धि कर पाएगा।
HIND305	DSE	लोक साहित्य	1. लोक साहित्य के प्रमुख रूपों का ज्ञान प्राप्त कर पाएगा। 2. लोकगीत, लोककथाओं, लोकनाट्य आदि के महत्व को समझ पाएगा । 3. लोक संस्कृति के विविध पहलुओं, परम्पराओं, लोककथाओं, लोकगीतों के उद्भव का ज्ञान प्राप्त कर पाएगा। 4. लोक संस्कृति की गहराई और उसका मानव, मानव जीवन पर पड़ने वाले प्रभाव को समझ पाएगा।
HIND307	GE-1	आधुनिक भारतीय साहित्य	1. स्वाधीनता सग्राम के इतिहास को भारतीय साहित्य के साथ जोडकर नये दृष्टिकोण से अपने विचारों को पुष्ट कर पाएगा। 2. महात्मा गांधी, महर्षि अरविंद के विचारों से परिचित हो पाएगा। 3. मार्क्सवाद व अस्तित्ववाद सम्बन्धी विचारधारा और इनका भारतीय साहित्य पर पडे प्रभाव पर चिन्तन कर आलोचनात्मक प्रवृति को जागृत कर पाएगा । 4. अनन्तमूर्ति, रवीन्द्रनाथ टैगोर, विजय तेंदुलकर की लेखन कला से परिचित हो पाएगा।
HIND303	SEC-4	चलचित्र लेखन	1. भारतीय सिनेमा के इतिहास की जानकारी प्राप्त

			कर पाएंगे। 2. वृतचित्र, विज्ञापन, फिल्म, फीचर फिल्म में अन्तर को समझ पाएंगे। 3. पटकथा लेखन, संवाद लेखन प्रक्रिया को समझ पाएंगे। 4. इस क्षेत्र की भाषिक संरचना की बारीकियों को समझ पाएंगे।
HIND304	SEC-4	समाचार संकलन और लेखन	1. समाचार संकलन व लेखन प्रक्रिया का ज्ञान प्राप्त कर पाएगा। 2. पत्रकारिता, समाचार लेखन, रिर्पोटिंग के विभिन्न रूपों व स्त्रोतों का ज्ञान प्राप्त कर पाएगा। 3. पत्रकारिता के क्षेत्र में स्थापित होने के लिए या इस क्षेत्र में उच्च शिक्षा के लिए आधार भूमि प्राप्त कर पाएगा।
HIND306	DSE	छायावादोत्तर हिन्दी कविता	1. प्रयोगवाद व प्रयोगवादी कवि लेखन से परिचित हो उनकी कविताओं का विश्लेषण कर पाएगा। 2. नागार्जुन व शमशेर बहादुर सिंह के जीवन और उनकी काव्य की विशेषताओं को समझकर समकालीन परिदृश्य से जोड़ पाएगा। 3. भवानी प्रसाद मिश्र, कुवंर नारायण की लेखन शैली के अन्तर को समझ पाएगा। 4. सर्वेश्वर दयाल सक्सेना व केदारनाथ सिंह की कविताओं की भाषिक सरंचना को समझ उनके कथ्य का विश्लेषण कर पाएगा। 5. सभी कवियों की कविताओं को भावपक्ष व कलापक्ष को समझकर उन पर आलोचनात्मक टिप्पणी कर पाएगा।
HIND308	GE-2	सर्जनात्मक लेखन के विविध क्षेत्र	1. रिपार्ताज, फीचर लेखन, साक्षात्कार स्तंभलेखन जैसी आधुनिक विधाओं की जानकारी प्राप्त कर पाएगा। 2. पत्रकारिता के विविध रूपों से परिचित हो अपनी रूचि के अनुसार विषय में विशेषज्ञता प्राप्त करने के लिए प्रेरित हो पाएगा

Course Specific Out Comes(पाठ्यक्रम विशिष्ट परिणाम):-

स्नातक स्तर पर इस पाठ्यक्रम का अध्ययन करने के उपरान्त:-

1. अपनी रूचि के अनुरूप उच्चतर शिक्षा या शिक्षण के क्षेत्र में जा सकते हैं।
2. भाषायी कौशल को प्राप्त करने के कारण स्वतन्त्र लेखन, सृजनात्मक लेखन, पत्रकारिता,

समाचार वाचक, समाचार लेखन, जनसंचार माध्यमों के क्षेत्र में जा सकते हैं ।

3. राज्य सरकार, केन्द्र सरकार, संघ लोक सेवा आयोग की विभिन्न प्रतियोगी परिक्षाओं में भाग ले सकते हैं ।
4. बैकिंग के क्षेत्र में जन-सम्पर्क अधिकारी के रूप में कार्य कर सकते हैं।
5. अनुवादक, दुभाषिया, दूतावासों के विभिन्न पदों को प्राप्त करने के लिए स्वयं को तैयार कर सकते हैं।
6. उच्च शिक्षा के उपरान्त विदेशी विश्वविद्यालयों, भारतीय विश्वविद्यालयों, महाविद्यालयों में अध्यापन का कार्य कर सकते हैं ।

M.Sc.PHYSICS	
M.Sc. Physics Career Prospects	M.Sc. Graduate from the degree programme in physics has a profound knowledge of physics and an adequate knowledge of the supporting minor subjects. She/he has a scientific way of thinking and solving problems.She/he is able to search for information and draw up reports, using the concepts of physics. She/he is capable of evaluating information with a critical approach.She/he also has a basic knowledge of the development of the scientific way of thinking and world view. She/he knows how to apply the existing knowledge of physics and how to carry out wide learning entities, research projects and laboratory demonstrations for teaching purposes. Opportunities after M.Sc. program include doing research in leading national and international universities, laboratories and research institutes. Some of the students go ahead to do industrial research in various fields, or opt to take up non academic jobs. Many find teaching jobs in schools or colleges.
Name of course (Course ode)	**Course Outcomes**
Mathematical Physics (PHYMS-101)	The aim and objective of the course on Mathematical Physics is to equip the M.Sc. student with the mathematical techniques for understanding theoretical treatment in different courses On completion of this course a students should be able to: 1. Apply techniques of complex analysis to solve integration. 2. Explain linear dependence and linear combination of vectors as quantities in physics. 3. Solve special function Bessel, Legendre, Hermite, Lagurre functions. 4. Define and manipulate the Dirac Delta, beta and gamma function and will be able to derive their various properties. 5. Be fluent in the use of Fourier and Laplace transformations to solve differential equations. 6. Solve partial differential equations with appropriate initial or boundary conditions with Green function techniques. 7. Able to understand and apply group theory in physics problems.
Classical Mechanics (PHYMS-102) Course Learning Outcomes:	The aim and objective of the course: The aim and objective of the course on Classical Mechanics is to train the students of M.Sc. class in the Lagrangian and Hamiltonian formalisms for discrete systems, Conservation theorems, Rigid body motion, Hamiltons equations, Canonical Transformations, Poisson's and Lagrangian brackets, Euler equations, Hamilton-Jacobi Theory and Lagrangian and Hamiltonian Formulations for continuous systems and fields to an extent that they can use these in the modern branches like Quantum Mechanics, Quantum Field Theory, Condensed Matter Physics, Astrophysics etc. Students will have understanding of: 1. The Lagrangian and Hamiltonian approaches in classical mechanics. 2. The classical background of Quantum Mechanics and get familiarized with Poisson brackets and Hamilton -Jacobi equation. 3. Kinematics and Dynamics of rigid body in detail and ideas regarding Eulers equations of motion. 4. Theory of small oscillations in detail along with basis of free vibrations.

Electronics I (PHYMS-103)	This course is to introduce students to the different components of microprocessors and microwave communication system. At the end of this course students will: 1. Know the working and applications of one bit memory (flip flop). 2. Understand the working various components of digital system like; registers, counters, converters and op-amp etc. 3. Understand the role of each component of microprocessor 8085. 4. Know the assembly language programming of microprocessor. 5. Be able to use op amp to perform various operations. 6. Understand the working various microwave generating devices. 7. Understand the microwave communication and advantages.
Computational Methods in Physics (PHYMS-104)	This course teaches the students programming tactics, numerical methods and their implementation like applying to problem in physics, including modeling of classical physics to quantum system as well as data analysis (Linear and non linear). Use analysis techniques for propagating error, representing data graphically. Create, solve and interpret basic mathematical tool.
Practical (PHYMS-105)	Physics Laboratory is to train the students to experimental techniques in general physics, electronics and condensed matter physics so that they can verify some of the things read in theory here or in earlier classes, so can co-relate the theoretical concepts with the experimental ones and are confidence to handle sophisticated equipment. The laboratory should help the student develop a broad array of basic skills and tools of experimental physics and data analysis. Helps students develop collaborative learning skills that are vital to success in many lifelong endeavors.
Quantum Mechanics - I (PHYMS-201) Course Learning Outcomes:	The aim and objective of the course: The aim and objective of the course on Quantum Mechanics is to introduce the students of M.Sc. class to the formal structure of the subject and to equip them with the techniques of Linear Vector- Space ,Matrix Mechanics, General Angular Momentum, Perturbation Theory and Fermi Golden Rule so that they can use these in various branches of physics as per their requirement. Students will have understanding of: 1. Importance of Quantum Mechanics compared to Classical Mechanics at microscopic level. 2. Linear vector spaces, Hilbert space, concepts of Basis, Vector and Operators and Bra and Ket notation. 3. Matrix formulation of Quantum Mechanics. 4. Time evolution of Quantum Mechanical systems i.e. Schrödinger, Heisenberg and Interaction pictures and their applications. 5. Various tools to calculate Eigen values and total Angular Momentum of particles.
Condensed Matter Physics (PHYMS-202)	It is important to understand the origin of various properties of condensed matter before using them, or designing new kind of material for particular application. This course is designed to impart the knowledge of theories and models in the field of condensed matter physics. At the end of this course students will have 1. Knowledge of models and theories developed to study the thermal and electrical

	conductivity of insulators and conductors. 2. Understanding of different methods of band structure calculation. 3. Ability to characterize materials on the basis of band gap. 4. Knowledge of different properties of semiconductors and Super conductors. 5. Knowledge of microscopic and macroscopic dielectric property of materials. 6. Knowledge of possible defects in a material and different properties of amorphous materials. 7. Ability to apply the obtained concepts to challenges in condensed matter physics.
Statistical Physics (PHYMS-203)	The aim of the course is to familiarize the students with the techniques and principles of Statistical physics to understand different systems (Ideal gas, non ideal gas, Fermi gas and boson gas). On completion of this course a student should be able to: 1. Understand the fundamental principles of statistical physics. 2. Derive Gibbs distribution function and will be able to find out Gibbs distribution of different systems. 3. Derive and understand Boltzmann distribution function, free energy of ideal gas, equation of state for ideal gas. 4. Derive Vander Waals formula, virial coefficient and scattering amplitude. 5. Understand and derive Fermi and Bose distribution and applications.
Electrodynamics (PHYMS-204)	This course includes the postulates of special theory of relativity, Lorentz transformations, motion of particle in various aspects of electric and magnetic fields like constant and varying fields including non-relativistic and relativistic motions of charge particle and magnetic mirroring. The Covariant Formulation of Electrodynamics in Vacuum gives information of Four vectors in Electrodynamics, covariant continuity equation, wave equation, covariance of Maxwell equations. The aim of the course is to take a glimpse of radiation from accelerated charges, Thomson scattering, Rayleigh scattering, absorption of radiation by bound electron.
Practical (PHYMS-205)	1. The course is designed to train the students so that they can efficiently handle various instruments. 2. Students will verify laws studied in the different theory course. 3. Students will practically study the working of different electronic components/ circuits. 4. Students will measure different properties of materials. 5. Students will be able to write programme for different numerical methods.
Quantum Mechanics II (PHYMS-301) Course Learning Outcomes	The aim and objective of the course: The aim and objective of the course on Quantum Mechanics is to introduce the students of M.Sc. class to the formal structure of the subject and to equip them with the techniques of Relativistic Quantum Mechanics: Klein Gordon equation, Dirac equation, fine structure of hydrogen atom, Lamb shift, Field Quantization, Relativistic Quantum Field Theory so that they can use these in various branches of physics as per their requirement. Students will have understanding of: 1. Theory of Scattering and calculation of Scattering Cross Section, Optical theorem, Born Approximation and partial wave analysis etc. 2. Theory of Identical Particles 3. Relativistic Quantum Mechanics using Dirac equation, Dirac matrices, The

	Klein Gordon equation etc 4. Second quantization of the Schrödinger wave field for bosons and fermions
Material Science (PHYMS-302)	From this course student will be able to think critically and understand the relationship between nano /microstructure, characterization, properties, processing and design of new material. Posses the skill and different material characterization techniques necessary for modern material practice.
Nuclear Physics (PHYMS-303)	This course is designed to provide understanding of structure and properties. At the end of this course students will have understanding of: 1. Nuclear forces and stability. 2. Nuclear models (Shell and Collective). 3. Excited states, quadruple moment, spin, parity and magnetic moment. 4. Experimental methods used to study the different properties of nuclei.
High Energy Physics (PHYMS-304)	The aim and objective of particle Physics is to familiarize with the concepts of Scattering Kinematics, Scattering Matrix and Phase Space, Dalitz plots. Invariance principles and conservation laws: parity, Charge, time reversal, charge conjugation, G-Parity, CP and CPT invariance. Unitary groups SU2, SU3 , Quark Model, Gell Mann Okubo Mass Formula, Weak Interactions, Classification of weak Interactions, Universality of Weak Interactions, Fermi Theory of weak interactions, Intermediate Vector Boson Hypothesis, Helicity of Neutrino, Two Component Theory of Neutrino, KoKo Mixing and CP Violation, KoKo Regeneration.
Practical (PHYMS-305)	1. The course is designed to train the students so that they can efficiently handle various instruments. 2. Students will verify laws studied in the different theory course. 3. Students will practically study the working of different electronic components/ circuits. 4. Students will measure different properties of materials. 5. Students will be able to write programme for different numerical methods.
Electronics-II (PHYMS- 401)	Course is to train and equip students to become skilled and specialized in vast discipline of Physics and Electronics. Know basics of electronics, its fabrication and synthesis techniques. An ability to design and conduct experiments, as well as to analyze and interpret data.
Nuclear and Particle Astro- physics (PHYMS-402(b))	The aim and objective of particle Physics is to familiarize with the concepts of The observational basis of Nuclear Astrophysics, The Origin of the Universe, the Hadron Era, the Lepton Era, The Radiation Era- Stellar Evolution, Evolution of Stars Nucleosynthesis, the Standard Model of the Universe, The Cosmdogical principle and the expansion of the Universe.
Nano Physics (PHYMS-403(a)) Course Learning Outcomes	The aim and objective of the course: The aim and objective of the course on Nano Physics is to familiarize the students of M.Sc. to the various aspects related to Preparation, Characterization and study of different properties of the nano materials so that they can pursue this emerging

	research field as career. Students will have understanding of: 1. Different type of nano materials, and their synthesis techniques 2. Size dependence of various properties 3. Various applications and perspectives of nanotechnology in the development of value added new products and device.
Opto-electronics (PHYMS-04(c))	Optical fibers are the media for fast and low noise communication. This course is designed to introduce the students to the working of different components of optical fiber communication system. At the end of this course students will 1. Understand the working of light emitting sourced used in optical fiber communication. 2. Understand the physics behind the optical communication. 3. Know the various techniques of optical fiber fabrication. 4. Understand the detection process. 5. Know the working of various semiconductor based optical signal detection devices. 6. Understand the working of display devices (LCD and holography).
Project (PHYMS-405)	All the M.Sc. Physics Students will do a supervised Physics Project in IV Semester. Department considers it an important culmination of training in Physics learning and research. This project will be a supervised collaborative work in Theoretical Physics (Condensed Matter Physics, Nuclear Physics, and Particle Physics), Experimental Physics, and Computational Physics. The project will aim to introduce student to the basics and methodology of research in physics, which is done via theory, computation and experiments either all together or separately by one of these approaches. It is intended to give research exposure to students at M.Sc. level itself.

M.SC. CHEMISTRY	
CourseCode & Title	**Course outcomes**
	SEMESTER I
Course -I Inorganic Chemistry	**Unit: I Group Theory**. • Learn about symmetry elements and its application in chemistry also become trained to apply group theory to determine various chemical properties, structure and bonding aspects of chemical molecules. **Unit: II Non Aqueous Solvents.** • Students will understand chemical and physical properties of these solvents and their advantage over aqueous solvents and will appreciate the role of these solvents for synthesis and stabilization of unusual compounds, complex and chemical species. **Unit: III Inorganic Hydrides.** • Recall of various theories of bonding. • Enable students to understand polyhedral skeletal electron pair theory,Wade's rule and Wade's Mingos rule • A deep understanding of application of polyhedral skeletal electron pair theory to describe bonding in cluster compounds. • Students will be able to explore a new area of research in cluster compounds **UNIT: III Organic Reagents in Inorganic Chemistry.** • Students will be able to understand the role of organic reagents in chemical and physicochemical methods of analysis. • Postgraduates will have deep understanding of masking, demasking reagents and other auxiliary operations of analysis and they will appreciate role of organic reagents in various fields like, industries, medicine and agriculture. **Unit:V Supramolecular Chemistry.** • Become able to understand nature and natural phenomenon like DNA transcription, translation, photosynthesis etc. • Discussion of basic supramolecular concepts and principles, receptor design principles and techniques are keys which opens doors to many chemical fields, viz. modern electronic, industrial, medicinal and catalytic fields.
Course II Organic Chemistry	**UNIT-I: Supramolecular Chemistry** • Students able to learn bonding other than covalent bond, addition compounds and their applications. • Extending the basic concepts of non covalent interactions and their essential role in areas of modern Chemistry, biochemistry, medical medicinal chemistry and other areas of biology. **UNIT-II Stereochemistry** • Understand the stereoisomer's and their properties, optical activity, stereospecific and stereoselective reactions, chirality, asymmetric synthesis. • The knowledge of compounds existing in different stereoisomerism forms having different physical, chemical and biological properties and hence applications in, medicinal, catalysis, synthesis and biological systems. **UNIT-III Reaction mechanism:** • Structure and reactivity, thermodynamic and kinetic requirements. Hammond postulate, Transition states and intermediates. Effect of structure reactivity. • Understanding the thermodynamic and kinetic requirements reaction conditions, transition states, intermediates formed during the course of reaction and applying the same knowledge for laboratory at industrial synthesis of complex compounds. **UNIT-IV Aliphatic Nucleophilic Substitution** • Students able to understand different kinds of organic reactions such as SN^1, SN^2, SET and SNi mechanism and factors affecting these reactions. Neighboring group mechanism, PTC, ultrasound and regioselectivity. • Exploring the basic chemical nature of aliphatic organic compound having electron deficient centre.

	• Types of reactions exhibited by different families of organic compounds. **UNIT-V Aliphatic Electrophilic Substitution and Free radical reactions.** • Get the knowledge of Bimolecular mechanism and factors affecting them radical reactions, related name reactions. • Understanding the chemical behavior of aliphatic organic compounds exhibiting polar and nonpolar characters. • Applying these concepts in industrial applications via green protocol to achieve environment friendly growth.
Course III Physical Chemistry	**UNIT I** • Students will develop problem-solving skills by identifying the molecular structure of organic compounds using multiple spectrometric techniques including NMR, ESR and Mossbauer able to determine activation energy to understand exchange reactions. **UNIT II** • Using rotational and vibrational spectra &basics of Raman spectra able to identify unknown compounds & their structures. U**NIT III & UNIT IV** • Study of different theories and processes of chemical kinetics help students to understand the different steps occur during chemical reactions and chemical processes e.g. food decomposition, microorganism growth, ozone decomposition, formation of polymers and water transport across cell membrane. **UNIT V** • Able to understand combustion, neutralization or precipitation reactions using fast reaction concept.
Course IV Mathematics for Chemists and Application of Computer in Chemistry	**UNIT I, II& III** • With basic knowledge of mathematics i.e. differential & integral calculus, coordinate system, vectors, matrices& determinants students will be prepared to deal with the concepts and theories of chemistry like quantum, statistical, kinetics, thermodynamics & group theory etc. **Unit IV & V** • This course develops capability of students to make the use of computers towards problem solving in chemistry and mathematics by learning algorithm term development forming their flow charts and making computer programme.
	SEMESTER-II
Course V Inorganic Chemistry	**UNIT: I Metal ligand bonding** • Understanding of basic theories (VBT, MOT) and advanced theories (CFT, ACFT or LFT)of metal ligand bonding • Enable students to understand complex bonding and distortion in regular geometries. • Students will become able to apply different theories to understand different physical and chemical properties of complexes. • With deep knowledge of CFT students will be able to characterize spinels, inverse spinels which are of very much use in magnetic recording media **UNIT: II Atomic spectroscopy.** • Determination of spectroscopic energy levels or terms applying spectroscopic rules for various electronic configurations. This insight into detailed picture of electrons with in atom and understanding of couplings, repulsions and of splitting. • Postgraduate becomes able to describe and interpret elemental composition by its electronic spectra. **UNIT: III and IV Electronic Spectra–I and II** • Exploitation of effect of crystal environment on relative arrangement of electrons and to study the correlation and energy levels in weak and strong crystal fields. • Can describe various electronic configuration through special, electronic, graphical ,quantitative and qualitative diagrams.(TS and Orgel diagram) **UNIT: V Magneto chemistry.** • Students learn origin of magnetism, classification of magnetic materials on the basis of their magnetic properties. Validate the interrelation between magnetic field and atomic and molecular structures. • Understands the uses of magnetic materials in medical examination, diagnosis,

	treatment and therapy.
Course VI Organic Chemistry	**UNIT-I Aromatic electrophilic and nucleophilic substitution** • Students learn different organic reactions and mechanism such as Arenium Ion mechanism SNAr, SN1, benzyne and SRN1 mechanism, factors affecting these reactions and naming reactions of electrophilic and nucleophilic substitution. • Knowledge of various electrophilic and nucleophilic reactions exhibited by aromatic compounds. • Understanding the mechanism of defending reactions and applying them in search work and drug synthesis. **UNIT-II Common Organic Reactions and their Mechanism.** • Different laboratory and industrial route for the synthesis of various Complex organic compounds. • Integration of different organic reactions for designing and synthesizing new organic compounds. **UNIT-III Reagents in Organic Synthesis.** • Learning of Synthesis and applications of many organic reagents including organolithium compounds. • Synthesis of different reagents, their role in synthesizing the important classes of organic compounds like drugs dyes indicators and polymers. **UNIT-IV Elimination Reaction.** • Understand mechanism like E1, E2, E1CB and E2C mechanism, factors affecting these mechanism, pyrolitic elimination and different named reactions. • Applying the concepts to convert saturated organic compound into another unsaturated organic compounds by elimination of small molecules. • Study the effect of different stereochemistry of compounds on elimination of cyclic and acyclic Systems **UNIT-V Pericyclic Reactions.** • Develop knowledge of Molecular orbital symmetry, Pericyclic reactions and classifications. PMO approach, cyclic addition, 4n and 4n+2 systems. Different named reactions • Effect of modes of activations on the path followed and the outcome of reactions following cyclic pathways. • Understanding various pericyclic reactions occurring in the biological processes.
Course VII Physical Chemistry	**Unit 1& II** • Develop a competent knowledge of classical thermodynamic principles to predict the feasibility of reaction, understand the thermodynamics of colligative properties & the working of power plants, engine, cooler radiator, heater etc. • Able to characterize a discontinuous phase transition between two phases of matter. **Unit III** • Using concepts of distribution law& phase equilibrium students will be able to describe one or multi component system, salt hydrolysis, distribution indicator, nature of solute in solvents and also extraction of metal from its ores. **Unit IV** • Able to understand basic principle& electro kinetic phenomenon of non-equilibrium thermodynamics. Also able to analyze biological process such as proteins (folding /unfolding) and transports through membranes. **Unit V** • Able to understand various corrosion processes, protection methods and material selection& also able to take part in research programmes to solve specific corrosion problems.
Course VIII Chemistry of Life and Environmental Chemistry	• The course outcomes the understandings of biological molecules and processes. • Major part of the course is aimed to enhance the awareness about our protective and productive environment. • Students come to learn that how the toxic elements can be analysed and treated.
Course IX A Inorganic Chemistry –A	• Becomes skilled in different kind of titrations mainly in redox and

Course IX B Organic Chemistry –B **Course IX-C** Physical Chemistry-C	complexometric. • This course develops in postgraduates the understanding of classical analytical skills applicable in commercial analysis and complex mixtures analysis. Student learns different routes to synthesize some compounds by green synthetic methods **Qualitative Analysis and Organic synthesis.** • Able to Separate and identify the organic binary mixture. • Separation of mixture of unknown organic compounds and analyzing each organic compound by determining their aromatic nature, functional group, elements, saturation and unsaturation, melting point and derivative formation. • To synthesis complex organic compound like dyes, indicators and drugs in the laboratory and industries. **Physical Chemistry practical** • Students will be able to understand the intermolecular interactions of different organic and inorganic solvents using viscosity & surface tension measurements. • Able to solve the problems related to refractive index of different solvents. • Able to determine and understand various parameters using different measurements like conductivity, adsorption and thermochemistry. • Students will be able to analyze different colloidal systems.
	SEMESTER-III
Course X Inorganic Chemistry	**UNIT: I Metal complexes.** • Learns synthesis structure and bonding in metal-pi complexes like metal nitroysyl, carbonyls, phosphines, cyanides and isocyanides. • Understands synergistic bonding, stabilizing unusual oxidation state and acidity of ligands and validate the use of these metal complexes in industrial, catalysis and commercial scale. **UNIT: II Analytical chemistry.** • Learn about sources of errors, propagation of errors, detection and minimization of various types of errors in chemical analysis. • Understands various statistical models, accuracy, precision, average and standard deviation, variance, its analysis and confidence interval which is helpful in analytical methods development and validation. • Student learns tests of significance, criteria for the rejection of analytical data and the least-square analysis method and its importance in analytical calibration **UNIT: III Photoelectron spectroscopy** • Become introduced with PES in chemical and quantitative analysis. • Learn to describe the molecular energy levels of oxygen, nitrogen and of different oxidation states of different species. • Study applications of auger electron spectroscopy in industries to determine the surface structure, morphology of alloy and metallic materials. **UNIT: IV Lanthanides and actinides.** • Learn about general properties, synthetic routes of lanthanide and actinide in their aqueous solution andwill be able to understand the typical properties and nature of lanthanides and actinides. • Postgraduates will gain knowledge of applicationsof these inner transition series elements in nuclear medicine, energy production and in industries as the catalyst based on their magnetic properties. **UNIT: V Nuclear Chemistry.** • Postgraduates learn the different types of nuclear reactions and their importance in nuclear energy production and to synthesize new elements by artificial transmutation • They learn working of different nuclear reactors like thermal, fast breeder pressurized heavy water reactors. • Become able to understand different counting techniques and their applications in radio analysis.
Course XI Organic Chemistry	**UNIT-I Ultraviolet and Visible spectroscopy:** • Students able to understand the basic principle, Laws of absorption Fisher Woodward rule and applications. • One of the most prominent techniques employed in a research, medicinal Sciences

	and industries. • Determination of unsaturation, conjugation, homo and hetero annular systems and concentration determination of unknown samples. **UNIT-II Infrared Spectroscopy:** • Develop the knowledge of basic Principle, instrumentation and various factors affecting IR spectra. Application of IR and Raman spectroscopy • Applying the principle of IR and Raman spectroscopy for determination of various functional groups and identification of an organic compound. • It can be used as reliable technique for measurement quality control and dynamics measurement. • Demonstrating knowledge and understanding the role of IR and applying these in forensic labs for Civil and criminal analysis. **UNIT-III NMR Spectroscopy** • Able to know the chemical shift, coupling constant, INDOR and NOE, C^{13}, 2-D and 3-D NMR and applications. • Applying the knowledge of NMR spectroscopy for the structure determination and identification of organic compounds emphasizing on the carbon hydrogen framework and geometrical relationships between the interacting nuclei. • Effectively demonstrate the use of NMR principle in active areas like medical, food, and polymer, analytical and pharmaceutical industries. **UNIT-IV Mass Spectroscopy** • Understand the basic Introduction, ion production, factors affecting fragmentation, instrumentation, naming reactions, TOF MALDI and applications. • Demonstrating the knowledge of mass spectroscopy in research areas and industries for the determination of Molecular weights and presence of different isotopic atoms in organic compound. • Applying the knowledge of mass spectrum which represents a powerful technique with a myriad of different applications not only in biology, chemistry and physics but also in clinical medicine, defense and even space exploration. **UNIT-V Photochemistry** • Get the knowledge of basic principles, photo oxidation, photochemistry of aromatic compounds, Norrish Type I and II. Photo reduction and Photo fries rearrangement. • Understanding various photo physical and photochemical phenomenon as screen in biological and natural processes like photosynthesis. • Demonstrating knowledge of photochemistry in modern printing Technology photography and polymerization reactions initiated by light.
Course XII Physical Chemistry	**Unit I Unit II** • Able to execute probability principles to the behavior of large ensembles of atoms or molecules and to predict thermodynamic properties of a system &understand adsorption properties of polypeptides in reversed- phase HPLC. **Unit III &Unit IV** • Students have a thorough understanding of the postulates of quantum mechanics and will be proficient with the conceptual tools required to use those postulates. • Students will be able to explain the solution of Schrodinger equation & able to reveal the individual behavior of sub atomic particle to understand how world work at small scale. **Unit V** • Able to describe and explain different photo physical processes and their kinetics. • Able to describe the interaction of excited states with their surroundings and analyze photo induced electron transfer and excitation energy transfer with quantitative models.
Course XIII -A Inorganic Chemistry-A	**UNIT: I Photo inorganic chemistry.** • Understands Basic photochemical and photo physical processes and the governing rules to apply the photo energy in practical chemical reactions. • Learns about solar energy concentration and its utilization in alternate energy source. • Study photo catalytic use of transition metal complexes in industrial and medical fields.

OR **Course XIII –B** Organic Chemistry –B	**UNIT: II Inorganic reaction mechanisms.** • Gain detail knowledge of different types of reactions and their mechanism. • Learn about the electron transfer theory and its application in inorganic metal complex. **UNIT: III Polymeric inorganic compounds.** • Bring one to be able how to synthesize a desired and modify a polymer for domestic and commercial uses likely in house hold materials, medicinal implants, artificial organs and overheating devices etc. • Understanding of immense use of these polymers as defense materials like bullet proof jackets etc. and making electrically active polymeric material. **UNIT: IV Stability constants of coordination compounds.** • Learn about stability constants, factors affecting stability of complex compounds, determination of stability constants by spectrophotometric, polarographic and kinetic methods. • Enable to explain the thermodynamic and kinetic stability of complexes. **UNIT: V Electronic spectra -III** • Study the electronic spectra cubic environments, explanation of the selection rules behind the electronic spectra. • Can evaluate and describe of 10 dq, B value, nepleuxtic series and spectrochemical series. • Charge transfer spectra and application to the complexes enable to describe some unusual electronic properties of some complexes dyes, organic dyes and simple inorganic substances.
OR **Course XIII–C** Physical Chemistry- C	**<u>Bio-Organic Chemistry Special Theory - I</u>** **UNIT-I Carbohydrates** • Study the Chemistry of Carbohydrates, structure, chemical reaction, disaccharides, polysaccharides and metabolism. • Using the knowledge of Carbohydrates for a healthy society by knowing their food sources and biological importance. • Understanding the role and Chemistry of Carbohydrates and applying the same in different areas Industries like energy supplements, alcoholic beverages, bioengineering, synthesis and medicine. **UNIT-II Amino acids** • To understand the methods of peptide synthesis sequence determination chemistry of insulin, oxytocin, purine, purines and nucleic acids with synthesis. • Demonstrating the knowledge of the structure and functions of proteins in various fields of Biology, health science nutrition, nursing, biotechnology and Pharmaceutical Sciences. • Understanding the role of insulin in glucose metabolism and working in various research departments and pharmaceutical industries for the treatment of diabetes. **UNIT-III Vitamins:** • Students able to understand the detailed chemistry of different vitamins including their biological importance. • Going through the course, students can understand the importance of vitamins in balanced diet which will help in creating a healthy society. • Most vitamins being coenzymes play an important role for enzyme activity, extending the ideas a new domain can be added in the research areas like drugs, energy supplements and nutrition. **UNIT-IV Enzymes:** • Students learn the Properties of enzymes, mechanism of enzyme action, chemical and biological catalysis, important enzymes, enzymes kinetics and enzyme inhibition. • The right perception will enable the students to have better understanding of human physiology. • Role and mechanism followed by the biocatalysts imbibes idea for invention of new drugs the better understanding of disease and hands drug formulations.

	UNIT-V Coenzymes. • Study of different Cofactors, prosthetic groups, apoenzyme, structure and biological function of different coenzymes with their mechanism of reaction. • Coenzyme studies being related to that of vitamins and enzymes as discussed earlier, helps in inculcation of better vision about human physiology, biological processes, nutrition value, research in nutrition and medicinal science. **<u>Physical Chemistry Special Theory</u>** **UNIT – I and II** **Adsorption** In this chapter we discuss the concept of ideal, non – ideal adsorption and catalysis. Single – layer adsorption – Langmuir adsorption isotherm, Multilayer adsorption – B.E.T. theory and its kinetic derivation and their applications. Unit second includes adsorption at solid – liquid interface column chromatography and its theory for one solute and several solutes. **UNIT – III** In this unit we study Solution and Interfacial Behaviour of Surfactants, then some properties of surfactants, micelle formation and their thermodynamics **UNIT – IV** **Electrochemistry** In this unit we study the Quantitative treatment of Debye - Hückel and Debye-Hückel-Onsagar (D-H-O) theory of conductance and Bjerrum and Fuoss treatments. **UNIT – V** **Nanometerials** In this unit we discuss an overview of applied chemistry of nanometerials, their Synthesis and characterization.
Course XIV –A Inorganic Chemistry-A **Course XIV–B** Organic Chemistry -B **Course XIV-C** Physical Chemistry- C	**Inorganic Chemistry Practical** • Students will become able to synthesize and purify inorganic complexes of cobalt, copper, nickel and aluminum. • Postgraduate students know the characterization and analysis methods of complex compounds by qualitative and quantitative methods. **Organic Chemistry Practical** • Students are able to understand the process of Determination and Estimation of different functionality in organic compounds. • Determination of iodine and saponification values of an oil sample and DO, COD and BOD of water sample. • Study the Multistep Synthesis of various organic compounds. • This lab course provides knowledge about presence of different functionality in organic compounds and determination of number and percentage of functional groups in organic compounds by various methods. • Students have opportunity to do a multistep synthesis starting with simple compounds to make complex compounds which are used in various pharmaceutical industries and making many chemical weapons. **Physical Chemistry Practical** • Able to understand the fundamental importance of solubility in a large number of scientific disciplines and practical applications. • Partition coefficient measurements help students to understand their use in pharmacology, in environmental science and in metallurgy (determine distribution of impurities between molten and solidified metals). • Using conductometric titrations able to measure the process of chemical reactions,

	to check water pollution and alkalinity in H_2O and tracing microorganism in food microbiology. • .Knowledge of phase diagram helps in the study of metallurgy, ceramics and provides valuable information about melting, casting, and another phenomenon. • By learning colorimetric techniques students will be able to determine the unknown concentration of chemical elements and protein content of commercial food. • Able to calculate the rate constant and order of the reaction involved in acid and alkaline hydrolysis. And understand the use of saponification reaction for the production of soap and glycerin, fire extinguishers.
	SEMESTER-IV
PART-A	**A- Specialization: Inorganic Chemistry**
Course-XV-A Advanced Organometallics (Special Paper II)	**UNIT: I Advanced Organometallics** • Learn about organometallic compound of transition elements, their classification, synthetic routes, bonding and structural aspects make able to know typical bonding in metallocene and fluxional organometallic compounds. **UNIT: II Homogeneous Transition metal complexes.** • General discussion of catalytic behavior of transition metals, the factors involved the basic catalytic processes. • Understands the catalytic behavior and their use in industrial and other chemical processes. • Selective preference of particular catalyst, particular process based on its homogeneous and heterogeneous nature. **UNIT: III Some important Homogeneous catalysis Processes.** • Students will be able to explain application of catalysis in commercial industrial medicinal synthetic routes and catalytic remediation and treatment of environmental pollutants. **UNIT: IV Metal – Metal bonding carbonyl and halide clusters.** • Learn about new branch of chemistry i.e. chemistry of metal clusters. • Gain knowledge of Polyhedral model of metal clusters, structure of metal carbonyls, clusters in three four, five and six vertices of transition metals. • Rhenium III based halide derivatives cluster involving the scrambling in bridge and terminal carbonyl • Become able to calculate number of metal metal bonds in given metal cluster; understand scrambling of carbonyl group which explains the fluxional behavior of metal carbonyls. **UNIT:V Transition metal carbon multiple bonded compounds**. • How metal carbon multiple bonding is helpful in preparation, structure, bonding, reactivity of metal carbene and carbyne complexes. • Their application in biological, industrial, medicinal and environmental synthesis and analysis.
Course XVI - A Modern Techniques of Chemical Analysis (Special Paper III)	**Modern Techniques of Chemical Analysis** The course is designed to learn the basic principles used in the instruments. Postgraduates become able to use modern instruments in the analysis. They are trained theoretically in five kinds of techniques and instrumentation viz. photometric, spectral, electro analytical, chromatographic and thermo analytical. **UNIT-I :Spectrophotometry** • Photometry laws and application in Chemical analysis. • Colorimetric and spectrophotometric principle, theory and instrumentation. • Different types of spectrophotometric techniques of analysis. • Spectrophotometric titrations theory, principle and applications. • Flourescence spectroscopic technique, its detailed explanations to chemical analysis. **UNIT-II : Atomic Spectroscopy** • Students become learned about atomic spectroscopic techniques of analysis. • Flame photometry principle and theory of working. • The atomic absorption spectroscopy instrumentation and its applications to trace analysis. • A short explanation to atomic emission spectroscopy with special emphasis on

	inductively coupled plasma-atomic emission spectroscopy. • Learning of all above techniques and interferences in their applications to analysis. **UNIT-III :Chromatographic methods:** • Learns about basic principle of chromatographic methods and behavior of solutes, column efficiency and resolution. • Instrumentation & applications of chromatography. • Comparison of Gas chromatography (GC) and High-Performance Liquid Chromatography (HPLC). **UNIT-IV : Polarographic Methods** • Students become aware about electro analytical techniques. • Polarography terminology, basic principle and factors effecting diffusion current • Polarographic analysis methodology and instrumentation. • Various kinds of currents and their significance involved in polarography. • Applications of polarography to inorganic and inorganic analysis. **UNIT-V: Thermo analytical methods:** • Instrumentation and factors affecting thermo gravimetric technique. • Applications to inorganic compounds, analysis of clays and soils and non-stoichiometric compounds. • Instrumentation and factors affecting Differential Thermal Analysis technique. • Applications to inorganic compounds analysis.
Course XVII -A Inorganic Spectroscopy (Special Paper IV)	**Inorganic Spectroscopy** **UNIT: I IR Spectroscopy** • Enable students to explain interaction at molecular level between IR radiations and matter. • Understanding of different types of molecular vibrations and their role in structural elucidation viz. functional group, mode of bonding and shapes of molecules. • Appreciate the role of technique in industry as well as research for the quality control and dynamic measurements in quantitative and qualitative analysis. **UNIT:II NMR Spectroscopy** • Students will be able to explain NMR phenomenon. • Application of this technique to study physical, chemical and biological properties of molecule. • Students will get thorough knowledge and importance of magnetic resonance for medical diagnosis and in industries. **UNIT: III NQR Spectroscopy** • Understanding of study of a technique for study of non spherical (prolate and oblate shape) nuclei. • Students will be able to understand percentage of ionic and covalent character in bond. • Thorough knowledge of Electric field gradient in Relationship to molecular structures. • Importance of spectroscopy for the nuclear study of substances that cannot be studied with NMR and other techniques, drug design and physical and chemical characterization of pharmaceutical products. **UNIT: IV Mossbauer spectroscopy** • Understanding of **Mossbauer effect**. • Instrumentation and applications to structure determination and elucidation. • Enable to understand it as an effective tool to study Mossbauer active nuclei, structure and bonding of complexes. • Understanding the activity of Fe catalysts through phase transformation • As an geological tool it is used for identifying the composition of iron containing specimens including meteors and moon rocks, iron rich rocks on mars **UNIT:V ESR Spectroscopy** • Students will know about Electron spin and its role in molecular structure elucidation • Understanding of different relaxation phenomenon, line width, Zero field splitting,

	Kramers degeneracy and their role in ESR structure interpretation.
Course XVIII-A Bio -Inorganic & Superamolecular Chemistry (Special Paper V)	**UNIT: I Metalloporphynes and metallo enzymes.** • To study porphyrins and their salient features. • To understand the structure of haemoglobin, myglobin chlorophyll and siderophores and enzymes and their biological applications • Transport of iron in microorganisms, study apoenzymes co enzymes metalloenzymes structure and functions of carboxypeptidase enzyme and carbonic anhydride. **UNIT: II Oxygen carrers.** • Understands transportation of oxygen and carbondixode in human body and microorganisms. • Come to synthesize or use artificial oxygen careers for oxygen transport. **UNIT: III Transport and storage of metals.** • Get enlightened with different transport mechanism in physiological processes and their role in sustaining life **UNIT: IV Inorganic compounds as therapeutic agents introduction of chelation therapy.** • Students will be able to correlate different biological and inorganic processes by studying the importance of Inorganic compounds as potential replacement of the typical organic drugs for prevention and treatment of diseases. **UNIT: V Nitrogen Fixation.** • To describe natural and artificial nitrogen fixation based on reactivity of coordinated dinitrogen and nitrogen metabolism in different forms • Potential of nitrogen to be used in synthesis of nitrogenous compound shaving biological and industrial use. • Artificial fixation of nitrogen can be a resolve for the future demand of agrochemicals and a way to meet out the food requirements for the increased population.
PART-B	**B- Specialization: Organic**
Course XV-B Synthetic Strategy (Special paper II)	The course is designed to learn the basic reactions and their mechanisms, reagents and rearrangement to understand Organic Chemistry. **UNIT-I Organic reagents** • Study of Reagents in organic synthesis, Wilkinson catalyst, Lithium dialkyl cuprates, LDA, DCC, Baker yeast, DDQ • Organic reagents demonstrate the significance of chemistry of specific, selective and sensitive reactions. • The knowledge of chemical processes catalyzed by organic reagents is used in chemical industry to transform various compounds into more specialized products. **UNIT-II Oxidation** • Students are able to understand the process of oxidation of alcohols, ozonolysis, oxidative cleavage, aromatization of six member ring. • Oxidation reactions are used to produce chemicals that are used in various syntheses. • Understanding various natural processes like formation of rust on metal surface, burning of fuels, digestion of food, etc. **UNIT-III Reduction** • To learn different reductive processes, reduction of nitro compounds, reductive coupling, acyloin ester condensation, cannizzaro reaction. • Understanding redox reactions like photosynthesis, combustion and corrosion, etc. • Reduction provides knowledge about various processes occur in daily life like combustion of batteries, methane gas stove, reduction of hydrogen peroxide to water in bleaching of clothes. **UNIT-IV Rearrangements** • To understand rearrangement reactions like benzil-benzilic acid, Favorskii, Arndt-Eistert synthesis, Bayer villiger oxidation, Hoffmann and curtius rearrangement • Rearrangement reactions provide knowledge about conversion of a molecule into another via intramolecular shifts • Arndt-Eistert synthesis was found to be very useful to extend the carbon chain in

	organic molecules. Therefore it helps to prepare large molecules from smaller one. **UNIT-V Disconnection approach** • Students get the knowledge of synthons and synthetic equivalents, disconnection approach functional group interconversion, one and two group C- X disconnection, chemoselectivity, reversal of polarity etc • Disconnection approach give knowledge about retrosynthetic pathway in which molecules to be synthesized, first break it down by series of disconnection into possible starting materials and then start the reverse synthesis to again synthesized target molecule. This is helpful to synthesise complex organic molecules in laboratory which are extracted from nature.
Course XVI- B Natural Products (Special paper III)	**NATURAL PRODUCTS** In this course students will be able to understand the chemistry of natural products obtained from plants and animals, their biosynthesis and applications in medicines. **UNIT-I Terpenoids** • Students understand the process of isolation, general methods of structure determination and biosynthesis of different examples. • Understanding the vital role of terpenoids in exerting metabolic control and in mediating intra and inter species interaction like pollination and defence in plants • Applying the mechanism of biosynthesis of terpenoids to synthesize many other artificial organic compounds. **UNIT-II Carotenoids and Xanthophylls** • Able to understand the Classification, isolation, general methods of structural determination and biosynthesis of different examples. • Application of carotinoids to protect all against photooxidative damage. • Understanding the mechanism of synthesis, chemical reactions and biological functions of different carotinoids **UNIT-III Alkaloids** • Learn the methods of isolation, general methods of structural determination and biosynthesis of different examples. • Study of biosynthesis of various alkaloids help the students to understand mechanism in biological system • Extending the basic concepts of nitrogen containing basic natural organic compounds their pharmacological effect and uses in medications as recreational drugs. **UNIT-IV Steroids:** • Able to explain Basic skeleton, stereochemistry, structural determination, synthesis and biosynthesis of many examples. • The knowledge of important steroids like cholesterol , sex hormones, their chemical and biological properties and applications in analytical and medical Sciences **UNIT-V Plant pigment** • Able to know the nomenclature, isolation, general method of structural determination, synthesis and biosynthesis of Anthocyanins, polyphenols and quinines. • Developing techniques for isolation and identification of bio compounds from natural products. • Exploring the basic chemical nature of biochromes and their applications of natural food colours and food products for more benefits.
Course XVII-B Medicinal Chemistry (Special paper IV)	**UNIT-I Drug design** • Students will be able to obtain the knowledge of Design and Development of new drugs, structure -activity relationship, factors affecting bioactivity, free Wilson analysis, Hansch analysis and their relationship. • The course represents one of the most important applicative parts of organic chemistry. Knowing the methods of drug designing, drug modifications, structure modifications etc., students can actively contribute in areas like pharmaceutical research, new drug designing for different diseases having maximum therapeutic values and least side effects. **UNIT-II Pharmacokinetics and Pharmacodynamic**

	• Students grasp the knowledge of medicinal chemistry, different pharmacokinetic parameters, treatment of enzyme stimulation, inhibition and initiator formation, Significance of drug metabolism in medicinal chemistry. • By the deep understanding of the pharmacokinetics parameters of a drug, modifications can be made for making new drugs having excellent therapeutic values. Similarly the pharmacodynamic parameters make them capable of better understanding of drug mechanism and thus modifying the drugs to have least side effects. **UNIT-III Antibiotics and anti-infective Drug** • Able to understand the structure, SAR and biological action of antibiotics. Mechanism of bacterial resistance and sulphonamides. • By understanding the structural activity relationship and make of action of antibacterial drugs many bacterial diseases can be reduced. **UNIT-IV Psychoactive drugs** • Students understand the concept of neurotransmitters, CNS depressants and stimulants, SAR and mode of action on CNS, general anesthetics, sedative, hypnotics and psychotropic drugs. • This course provides knowledge of psychoactive drugs which help to understand the stimulant and depressant effect of brain which affect the behavior of Human being. **UNIT-V Therapeutic Agents, SAR and their mode of action** • Study different categories of drugs like Antineoplastic agents, cancer chemotherapy, cardiovascular drugs, antihistamine agents antifertility agents and diuretics • Knowledge of mode of action, type of drugs used to cure the disease, amount taken and side effects of drugs on body are important to understand physiology of human body • By understanding the major biological issues in the society like cancer, heart failure, kidney failure and uncontrolled population, drugs like antineoplastic agents, cardiovascular drugs, diuretic and antifertility agents has great role to resolve these problems.
Course XVIII- B Polymer Chemistry (Special paper V)	**UNIT-I Chemistry of Polymerization:** • Students able to understand Macromolecular concept, different types of polymerization, concept of copolymerization. • The course efficiently introduces different techniques and mechanisms for polymerization, effect of polymeric composition on properties and hence applications. The well equipped students can exploit the knowledge in the ever growing polymer industry. **UNIT-II Polymer Synthesis and Characterization** • This course described the different techniques of polymer synthesis, different methods of characterization of polymer, Measurements of molecular weight. • The course gives information about different technique of polymer synthesis, its characterization and practical significance of molecular weight. **UNIT-III Stereoisomerism in polymers and Morphology and order in crystalline polymers** • Study the types of stereoisomerism in polymers, Cellulose and amylose, Configuration of Polymer chains, Crystallization and melting etc • Applying the knowledge of stereoisomerism effects on properties, crystallization, Tm, Tg, physical properties, polymer utilization and property requirement, etc., new materials having broad applications can be designed. **UNIT-IV Polymer Reactions** • Students are able to understand polymer reactions, Graft copolymerization, polymer as carrier support. • Study of general polymeric reactions, vulcanization, cross linking and graft- co polymerizations • Introduction of different functional on main polymeric chain increase applicability of polymer and these graft co polymer used in various field as catalyst and Drug carrier. **UNIT-V Commercial and Specialty Polymers**

	• Able to know different types of polymers and their applications, Fundamentals of Supramolecular Chemistry of polymers. • Knowledge of polymers encountered in everyday life, their synthesis and various applications.
PART-C	**Course-XV C** **(Physical Chemistry Special Theory-II) (Quantum Chemistry** **UNIT – I and – II** In this unit we study time-independent perturbation theory for non-degenerate states, application to particle in one-dimensional box, ground state helium atom and Stark effects. Further, in second unit we study variation theory for ground and excited state energy and their applications and an over view of Hellmann-Feynman theorem. **UNIT – III** This unit includes Many -Electron Atoms: Concept of spin and Pauli exclusion principle. Slater determinants. Hartree Self Consistent –Field Method and Hartree – Fock Self Consistent –Field Method and finally the concept of Koopman's theorm. **UNIT – IV** In this unit we study The Born-Oppenheimer Approximation, The linear combination of atomic orbital (LCAO)-approximation and **UNIT – V** includes Huckel Molecular Orbital Theory of conjugated Π- electron Systems and applications
Course XVI-C	**(COURSE –XVI C)** **(PHYSICAL CHEMISTRY SPECIAL THEORY - III)** **(SOLID STATE CHEMISTRY)** **UNIT – I** **X-ray Diffraction & Crystal Structure** In this unit we study, The Laue equations and Bragg's law and X-ray diffraction experiments includes powder method, single crystal method and about Reciprocal lattice. **UNIT – II** This unit includes Bonding in crystals, Band theory. Schottky and Frankel defects and Free electro theory (a qualitative treatment) Zone theory and an important Brillioun zones, k – space. **UNIT – III** This chapter covers the Electrical properties of metals, conductors and non – conductors, Hall effect. Thermal properties Optical properties and Dielectric properties **UNIT – IV** **Superconductivity** In this unit we study Meissner effect and Thermodynamic effects of superconducting species and finally discuss BCS theory of superconductivity. **UNIT – V** In the last unit we understand Solid State Reactions and their General principles, experimental procedures, kinetics of solid state reactions, also discuss vapour phase transport methods, interaction or ion exchange reaction, electrochemical reduction methods, preparation of thin films, growth of single crystal.
Course XVII – C	**(COURSE –XVII C)** **(PHYSICAL CHEMISTRY SPECIAL THEORY - IV)** **(BIOPHYSICAL CHEMISTRY)** **UNIT – I** **Cell membrane and its structure** In this unit we study, The Cell Membrane, lipids in biological membranes, phospholipids, sphingolipids,glycolipids, cholesterol, gangliosides, lipoproteins, types and arrangements of proteins in membranes. Further an over view of Danielli and Davson model, Fluid Mosaic Model and finally hydrolysis of ATP and its synthesis from ADP. **UNIT – II** This unit includes Statistical mechanics in biopolymers chain configuration of macromolecules, Polypeptide and protein structures and protein folding neurons, synapse, neurotransmitters.

	UNIT – III This chapter covers Transport through cell membrane, active and passive transport and Donnan effect in Osmosis, its dependence on pH difference across the membrane and Bio-mechanics. **UNIT – IV** **Biomolecular Interactions** In this unit we understand some Interactions between biomolecules the Scatchard plot and forces involved in the stability of proteins. **UNIT – V** In the last unit we can understand Protein sequence and structure α-helix, β-strand, β-sheet, turns and loops, quaternary structure, globular and fibrous proteins. Finally an important Protein folding and refolding, Protein misfolding, Chaperones and Brain diseases. .
Course XVIII–C	In this unit we study, classification and importance of Macromolecules, condensation and addition reactions and Polymer solutions, criteria for polymer solubility, conformations of dissolved polymer chains. **UNIT – II** This unit includes Thermodynamics of polymer solutions, ideal solutions, regular Flory – Huggins Theory and Flory – Krigbaum theory for dilute polymer solutions. Also includes Structure determination techniques: X-ray crystallography, NMR, Microscopy: TEM, SEM, STEM, AFM for macromolecules **UNIT – III** This chapter covers statistical thermodynamics of interpenetrating random coiling polymers in solution with application to phase separations, swelling of networks, depression of melting point. Then some techniques like osmometry, light scattering, neutron scattering intrinsic viscosity, size exclusion chromatography, sedimentation for the dertermination of average no. and average mass of the macromolecules. **UNIT – IV** In this unit we understand Rheology and Mechanical Properties of Polymers and practical importance of their aggregation states, viscoelasticity and Applications of polymers **UNIT – V** In the last unit we can understand Mechanical strength and life time of polymer mechanism of polymer fracture, effect of various factors on the mechanical properties of polymers and Polyelectrolytes.
Course XVIII-C	**Unit I & II** • Able to classify polymers and understand different theories involve thermodynamics of polymer solution which have considerable practicals well as theoretical importance. • Able to apply different techniques for the determination of structure of polymers & use the knowledge for the designs of many processes and products. **Unit III** • Able to describe the static and dynamic methods to analyze size and mass of polymers. • Differentiate easily between rigid plastics and flexible plastics. • Able to do the network modeling of the influence of swelling on the transport behavior. **Unit IV** • Students will be able to describe rheological and mechanical properties of polymers and explain their use in the production of polymeric materials. **Unit V** • Able to understand the mechanical strength and life time of polymer and apply the knowledge of mechanical strength in fabrication and composite new polymers. • Able to explain the nature of polyelectrolytes which modify flow and stability properties of aqueous solution and gel used in varied industries.
Practical Course to Each Specialization	

Course XIX-A Inorganic Chemistry Practical OR **Course XIX-B** Organic Chemistry Practical OR **Course XIX-C** Physical Chemistry Practical	**Course XIX-A** **Inorganic Chemistry Practical** • The students are given the exposure to instrumental analysis in the following instrumentation techniques. • Electronic absorption spectroscopy (Spectrophotometry and titrations) • Atomic emission spectroscopy (Flame Photometry) • Electro analytical (conductometric, potentiometric, polarography cyclic voltammetry and pH metric.) • Students become skilled in handling the instruments and which they could apply in research and carriers in industries and other agencies. **Course XIX-B** Organic Chemistry Practicals **Extraction of organic compounds from natural sources, paper chromatography, spectroscopy and multistep synthesis.** Organic compound present in natural source are extracted by different methods and various compounds extracted like caffeine from tea, casein from milk, β- carotene from carrots and lycopene from tomatoes. • Identification and separation of organic compounds are done by paper chromatography and thin layer chromatography. • Natural products from plant extracts provide unlimited opportunities for new compounds. • Experimental work solves many problems and key challenges in the extraction, isolation and characterization of many unknown organic compounds. • The knowledge of multistep synthesis helps the students to make complex organic compound from readily available simple compound. • From the multistep synthesis of indigo, vacor and various compounds, students learn the mechanism and formation of these compounds which in colouring cloths and hairs and vacor used as rat killer etc. **OR** **Physical Chemistry Practicals(**Course XIX-C**)** • Become familiar with instrumental analysis techniques in chemistry. And become proficient in data analysis and interpretation. • Able to analyze the various intermolecular interactions in solution and molar mass of compounds by using viscosity & cryoscopy. • Able to understand solvent structural activity of solute, using Conductivity of different ionic solutions & able to measure different thermodynamics parameters. • Students will gain insight to analyze different solutions using potentiometry, Flame photometry & Colorimetry. • Able to understand optical activity behavior of different substances by Polarimeter measurements.
Course XX Seminar for all the three Specializations	Seminars are specially meant to assess the students for the development of all above outcomes and below listed specific outcomes.

MUSIC DEPARTMENTCPROGRAM SPECIFIC OUTCOME

संगीत का मानव जीवन में महत्वपूर्ण स्थान है। संगीत प्रकृति के कण कण में बसा हुआ है। संगीत मन के भावों को अभिव्यक्त करने का सर्वोत्तम साधन रहा है। संगीत का मानव जीवन के जन्म से लेकर मृत्य तक

संबंध जुड़ा हुआ है। बिना संगीत के मानव जीवन अधूरा है। संगीत का अस्तित्व वैदिक काल से माना जाता है।

पहले संगीत की शिक्षा गुरू शिष्य परंपरा द्वारा दी जाती थी। जिसमें शिष्य गुरू के पास वर्षों शिक्षा ग्रहण करता था। किंतु अब संगीत सिखना आसान हो गया है। संगीत शिक्षा को विद्यालयों, महाविद्यालयों और विश्व विद्यालयों में विषय के रूप में पढ़ाया जा रहा है। शिक्षण संस्थानों में एक निश्चित पाठ्यक्रम निर्धारित किया जाता है जो विद्यार्थियों को निश्चित समय पर पूरा करना पड़ता है।

इस पाठ्यक्रम का अध्ययन करने के पश्चात विद्यार्थी संगीत को समझने, गहराई से परीक्षण करने और संगीत को स्पष्ट रूप से व्यक्त करने में समर्थ होता है।

विद्यार्थी की रूचि के अनुसार उनके प्रदर्शन की कुशलता को विकसित करता है, साथ ही संगीत के विभिन्न रूपों को अवलोकित करके अपने कौशल को भी विकसित करता है। विद्यार्थी विभिन्न भावों और परिस्थितियों से सामजस्य स्थापित करने की योग्यता को विकसित करता है।

विद्यार्थी की संगीत और इससे संबंधित क्षेत्रों के बारे में प्रभावपूर्ण तरीके से सोचने, बोलने और लिखने की क्षमता को बढ़ाता है।

विद्यार्थी के सुनने, पहचानने और संगीत के तत्वों के माध्यम से स्वरलीपी के साथ काम करने की क्षमता को विकसित करता है।

विद्यार्थी किसी भी प्रतियोगिता में प्रोफेशनल की तरह तकनीक, निपुणता और हाव-भाव के प्रदर्शन के माध्यम से वह अपनी शिक्षा की कुशलताओं को विकसित करता है।

Course Code	Title of Course	Course Outcomes
MUSA 101TH	**Theory of Indian Music (General), Biographies of Musicians, composers & Musicologists**	**इस पाठ्यक्रम का उदेश्य विद्यार्थी को संगीत, नाद, श्रुति, स्वर, वरण, राग आदि से अवगत कराना है। साथ ही अपने पाठ्यक्रम के वाद्यों के बारे में ज्ञान प्राप्त करना है।** **भारतीय संगीतकारों का जीवन परिचय तथा संगीत में इनके योगदान के बारे में ज्ञान प्राप्त करना है।**
MUSA 102 PR	**Practical**	**इस पाठ्यक्रम में विद्यार्थी अल्हैया बिलावल, काफी, भैरव रागों में अलंकार, रजाखानी गत तथा मिजराब के बोलों को प्रदर्शित करने में सक्षम होगा। तीन ताल, दादरा ताल का पूर्ण परिचय लिखने और ताली सहित प्रदर्शित करने में सक्षम होगा।**
MUSA 103 Th	**Theory of Indian Music, General & Biographies**	**इस पाठ्यक्रम के अनुसार मेल, थाट, आश्रय राग, राग लक्षण, श्रुति, अलंकार, गमक वादी-संवादी, अनुवादी, विवादी, वक्र तथा वर्जित स्वर आदि के बारे में जानकारी प्राप्त करेगा। साथ ही पाठ्यक्रम में निर्धारित किए गए रागों एवं संगीतकारों के बारे में जानकारी प्राप्त करेगा।**
MUSA 104 PR	**Practical**	**यमन, भुपाली, बिहाग रागों का पूर्ण रूप से अध्ययन करेगा। साथ ही विद्यार्थी एकताल, झप ताल को ताली-खाली के साथ प्रदर्शित करने में सक्षम होगा।**

MUSA 201 TH	**Ancient Granthas & Contributions of Musicologists**	**इस पाठ्यक्रम में विद्यार्थी निर्धारित किए गए शब्दों के बारे में जानकारी प्राप्त करेगा। भातखंडे एवं विष्णु दिगंबर जी की स्वरलिपी पद्वति, ताल एवं बंदिशों को लीपीबद्ध करने में सक्षम होगा। साथ मारू बिहाग, मालकौंस और वृंदावनी सारंग रागों के में ज्ञान प्राप्त करेगा।** **वैदिक संगीत तथा नाट्य शास्त्र, संगीत रत्नाकर, वृहद देशी आदि प्राचीन ग्रंथों के बारे में विस्तार से अध्ययन करेगा। भारतीय संगीतकार विष्णु दिगंबर पलुस्कर, स्वामी त्यागराज, पंडित शारंग देव जीवन परिचय जानेगा। साथ ही शास्त्रीय व सुगम संगीत के बारे में जानकारी प्राप्त करेगा।**
MUSA 202 PR	**Practical**	**इस पाठ्यक्रम द्वारा मारू बिहाग, मालकौंस तथा वृंदावनी सारंग रागों में मसीतखानी गत, रजाखानी गत को क्रियात्मक रूप से प्रदर्शित करने में सक्षम होगा। साथ ही चार ताल, धमार, रूपक, झप ताल को दुग्गन-चौगुन सहित हाथ द्वारा ताली बजाकर प्रदर्शित करने में सक्षम होगा।**
MUSA 203 TH	**Medieval Granthas & Contribution of Musicians**	**इस पाठ्यक्रम के अंतर्गत विद्यार्थी आलाप, जोड़ झाला, ठुमरी, दादरा, टप्पा, संधि प्रकाशक राग परमेल-प्रवेशक रागों के बारे में जानकारी प्राप्त करेगा। राग बागेश्वरी, मियां मल्हार और जौनपुरी आदि रागों का पूर्ण परिचय प्राप्त करेगा। पाठ्यक्रम के अध्ययन से रागों के समय सिद्धांत के बारे में विद्यार्थी को ज्ञान प्राप्त होगा। निर्धारित किए गए ग्रंथ तथा संगीत शास्त्रकारों का परिचय और उनके योगदान के बारे में ज्ञान प्राप्त करेगा।**
MUSA 204 PR	**Practical**	**बागेश्वरी, जौनुपरी, मियां मल्हार आदि रागों में मसीतखानी गत, रजाखानी गत को क्रियात्मक रूप से प्रदर्शित करना सीखेगा। रूपक, चौताल, कहरवा ताल को हाथ द्वारा ताली बजाकर प्रदर्शित करने में सक्षम होगा।**
MUSA 205 PR	**Skill Enhancement Course-II Hindustani Music**	**इस पाठ्यक्रम द्वारा विद्यार्थियों के कौशल में वृद्धि के लिए वाद्यों को स्वरबद्ध करने की तकनीक बताई जाती है। जिससे विद्यार्थी स्वर पहचान में निपुण हो सकें।** **विद्यार्थियों को दूरदर्शन, आकाशवाणी, संगीत नाटक अकादमी आदि में भ्रमण करवाया जाएगा। जिससे विद्यार्थी को संगीत को और अधिक समझने में सहायता मिलेगी।**

MUSA 206 PR	**Skill Enhancement Course-II Hindustani Music**	**इस पाठ्यक्रम में विद्यार्थी को तबला वाद्य पर तीन ताल, कहरवा ताल को क्रियात्मक रूप में प्रदर्शित करने में सक्षम बनाया जाएगा।** **ध्वनि प्रणाली को संचालित करने के बारे में जानकारी प्राप्त करेगा। संगीत समारोह, संगीत उत्सवों में जाकर और उनमें भाग लेकर संगीत को गहन रूप में समझने में सक्षम होगा।**
MUSA 301 PR	**Skill Enhancement Course-III Hindustani Music**	**समसामायिक शास्त्रीय संगीत प्रदर्शन में पावर प्वाइंट, प्रेजेंटेशन का महत्व समझने में समक्ष होगा। हारमोनियम तथा तबला की प्राथमिक तकनीक की जानकारी प्राप्त करेगा।** **आकाशवाणी-दूरदर्शन राज्य उत्सव का भ्रमण करके संगीत की विभिन्न प्रणालियों के बारे में जानकारी प्राप्त करेगा।**
MUSA 302 PR	**Skill Enhancement Course-IV Hindustani Music**	**इस पाठ्यक्रम में विद्यार्थी मधुर संगीत की रचना करने में सक्षम होगा।** **संगीतकारों के जीवन और उनके योगदान के बारे में व्याख्यान करने में सक्षम होगा।**
MUSA 303 TH	**Theory of Indian Music and Study of ancient Granth and Ragas**	**इस पाठ्यक्रम से विद्यार्थी हिमाचल प्रदेश के लोक संगीत को गहराई से जान पाएगा। साथ ही धुनिक संगीत में संगीत के प्रचलन का ज्ञान का प्राप्त करेगा।** **हिंदुस्तानी शास्त्रीय संगीत में समय सिद्धांत का क्या औचित्य है, इसका भी ज्ञान प्राप्त करेगा। विभिन्न ग्रंथों एवं ग्रंथकारों, गायकों के गुण- अवगुण मार्गी-देशी संगीत, अर्विभाव-तिरोभाव, ताल के प्राणों के बारे में ज्ञान प्राप्त करेगा।** **हिंदुस्तानी शास्त्रीय संगीत में प्रयोग होने वाले वाद्यों तथा ताल के बारे में ज्ञान प्राप्त कर सकेगा। ग्राम मुर्छना, जाति आदि का गहन अध्ययन कर प्राचीन काल में उनका क्या औचित्य था और आज के संदर्भ में क्या औचित्य है, के बारे में ज्ञान प्राप्त कर सकेगा।**
MUSA 304 PR	**Discipline Specific Elective-III Practical**	**इस ठ्यक्रम में विद्यार्थी दिए गए रागों तोड़ी, भैरवी, दरबारी कान्हड़ा में मसीतखानी-रजाखानी गतों और विभिन्न प्रकार के तालों को विभिन्न लयकारियों में क्रियात्मक रूप से प्रदर्शित करने में सक्षम होंगे।** **विद्यार्थी की सांगीतिक प्रतिभा का बढ़ाने के लिए कक्षा में गायन वादन किया जाएगा।**
MUSA 305 TH	**Discipline Specific Elective-I**	**इस पाठ्यक्रम में विद्यार्थी को निबद्ध, अनिबद्ध, प्रबंध, काकु, स्थाय, वर्ण, वृंदगान, वृंदवादन आदि**

		सांगीतिक शब्दों का ज्ञान होगा। सांगीतिक ताल वाद्यों का प्रयोग करना सीखेगा। विद्यार्थी दस थाटों, घराना परंपरा, संगीत की विभिन्न शैलियों का ज्ञान प्राप्त करने में सक्षम होगा। संगीत और सौंदर्य शास्त्र के संबंद्ध को समझने में सक्षम होगा। इस पाठ्यक्रम में विद्यार्थी शास्त्रीय संगीत और फिल्म संगीत के बारे में ज्ञान प्राप्त करेगा।
MUSA 306 PR	**Discipline Specific Elective-II**	इस पाठ्यक्रम में विद्यार्थी भीम प्लासी, देस, पूरिया धनाश्री रागों में मसीतखानी, रजाखानी गतों को अपने वाद्य पर प्रदर्शन करने के योग्य होगा। विद्यार्थी विभिन्न प्रकार की तालों का अध्ययन करने में सक्षम होगा। भैरवी और मालकौंस रागों पर आधारित फिल्मी गानों को पहचाने में निपुण होगा।
MUSA 307 TH	**Theory of Indian Music And Folk Music of Himachal Pradesh**	इस पाठ्यक्रम में विद्यार्थी हिमाचल प्रदेश के लोकगीतों का अध्ययन करेगा और इसमें विद्यार्थी हिमाचल प्रदेश के पारंपरिक वाद्य यंत्रों जैसे रणसींघा, शहनाई और करनाल के बारे में ज्ञान प्राप्त करेगा। विद्यार्थी इस पाठयक्रम के अंतर्गत संगीत और संस्कृति का संबंद्ध संगीत का मानव जीवन में प्रभाव आदि को समझने में सक्षम होगा। हिमाचल प्रदेश के संगीतकारों का जीवन परिचय, रागों, ताल आदि का ज्ञान प्राप्त कर सकेगा।
MUSA 308 PR	**Generic Elective- II Practical**	इस पाठ्यक्रम में क्रियात्मक अध्ययन किया जाएगा। जिसमें विद्यार्थी अलंकारों, सितार को बचाने की तकनीक, रजाखानी गतों और झाला आदि के बारे में ज्ञान प्राप्त कर सकेगा।

Programme outcomes: B.Sc. Physical ScienceB.Sc.s

- After successful completion of B.Sc. Programme the students would have the following attributes.
  The graduate will acquire scientific temperament to analyze any problem he comes across.
  The graduate will become successful professional by demonstrating logical and analytic thinking

ability

- The graduate will work and communicate efficiently in inter-disciplinary environment, either independently or in a team, and demonstrate leadership quality.
- The graduate will engage in life-long learning and professional development through self-study, continuing education or professional and doctoral level studies.
- The graduate will understand the impact of science on society.
- 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.
- The graduate will analyze situations, search for the truth and extract information, formulate and solve problems in a systematic and logical way.
- The science graduate will be able to perform job in divers 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.

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, formulates, and solves 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.

NAME OF COURSE AND COURSE CODE	COURSE OUTCOME (COs)
Course Title : Mechanics **Course Code : PHYS101TH**	Student should be able to: Formulate general mechanics parameters and distinguish

Course Type : Core Course – I (First Year) **Credits : Theory-04**	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.
Course Title: Electricity ,Magnetism and EMT **Course Code: PHYS102TH** **Course Type: Core Course – IV (Second Year)** **Credits:Theory-04**	Student should be able to: 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.
Course Title: Statistical Mechanics and Thermal Physics **Course Code: PHYS201TH** **Course Type: Core Course- VII** **(Second Year)** **Credits:Theory-04**	Student should be able to: To study physical behavior of an assembly of large number of particles using concept of Physics. 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.
Course Title: Physics Workshop Skills **Course Code: PHYS203TH** **Course Type: SEC – 1** **(Second Year)** **Credits:3+1=4**	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.
Course Title: Computational Physics Skills **Course Code: PHYS204TH** **Course Type: SEC – 1** **(Second Year)** **Credits:3+1=4**	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.
Course Title: Waves and Optics **Course Code: PHYS202TH** **Course Type: Core Course – X** **(Second Year)** **Credits:Theory-04**	Student should be able to: 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
Course Title: Electrical Circuits and Network Skills **Course Code: PHYS205TH** **Course Type: SEC – II** **(Second Year)** **Credits:3+1=4**	The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode. This course covers: Basic Electricity Principles. Understanding Electrical Circuits. Electrical Drawing and Symbols. Generators and Transformers. Electrical Wiring
Course Title: Elements of Modern Physics **Course Code: PHYS301TH** **Course Type: DSE– 1A** **(Third Year)** **Credits:Theory-04**	Student should be able to: 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
Course Title: Solid State Physics and Electronics **Course Code: PHYS302TH** **Course Type: DSE – 1A** **(Third Year))** **Credits:Theory-04**	Student should be able to: 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. To analyze junction diode, Rectifier and Filters, Transistors, Amplifiers, Oscillators
Course Title: Physics of Devices and Instruments **Course Code:PHYS306TH** **Course Type: DSE – 1B** **(Third Year))** **Credits:Theory-04**	This course is to get exposure with various aspects of instruments and their usage through hands-on mode.After Completing the course the student will be able: To analyze Semiconductor Devices like BJT, FETand MOSFETs.

	To understand the power supply, Filters and Multivibrators. To understand the process of fabrication and processing of devices To understand and analyse Signal Processing and communication.
Course Title: Radiation Safety **Course Code: PHYS307TH** **Course Type: SEC – III** **(Third Year))** **Credits:04**	The outcome of this course is to impart the knowledge of how x-rays, radioactive radiations and other radiations can be produced, detected, the harmful effect of radiation on living cells and how much dose of radiations are permissible according to International Commission on Radiological Protection (ICRP) when human being is using it. On the other hand this course impart the students with the knowledge that how these radiations interact with matter and use of different type of radiations in the different fields such as Medical science, Archaeology, Art, Crime detection, Mining and Industries.
Course Title: Applied Optics **Course Code: PHYS308TH** **Course Type: SEC – III (Third Year))** **Credits:04**	Student should be able to: Study about He- Ne LASER and its applications. Concept of Spatial frequency filtering, Fourier transforming property of a thin lens. To study the interference pattern from a Michelson interferometer. Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometer, and character recognition. Optical fibers and their properties, Principal of light propagation through a fiber, The numerical aperture, Attenuation in optical fiber and attenuation limit, Single mode and multimode fibers, Fiber optic sensors: Fiber Bragg Grating.
Course Title: Nuclear and Particle Physics **Course Code: PHYS304TH** **Course Type: DSE – 1B** **(Third Year)** **Credits:Theory-05+01**	Student should be able to: 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.

Course Title: Quantum mechanics **Course Code: PHYS305TH** **Course Type: DSE – 1B** **(Third Year))** **Credits:Theory-04**	Student should be able to: 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.
Course Title: Astronomy and Astrophysics **Course Code: PHYS303TH** **Course Type: DSE – 1B** **(Third Year))** **Credits:Theory-05+01**	Student should be able to: Formulate general parameters distance, time brightness, temperature. 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.
Course Title: Weather Forecasting **Course Code: PHY309TH** **Course Type: SEC – IV (Third Year))** **Credits:04**	Student should be able to: The ability to interpret weather information from satellite images enables people to make informed decisions about their day. By learning a few basic weather rules, anyone can use satellite images to predict the weather for their location for the upcoming afternoon or the next day.
Course Title: Renewable Energy and Energy Harvesting. Course Code: PHYS310TH Course Type: SEC – IV (Third Year)) Credits:04	Course gives introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technology and application. Prepare for the challenges of designing, promoting and implementing renewable energy solutions within society's rapidly-changing energy-related industry cluster. The student will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro.

Learning outcomes for the Physics Practical's at undergraduate program:	Students will demonstrate an understanding of core knowledge in physics, including the major premises of Mechanics, E&M, Electronics, Optics, Laser, Heat,Digital Electronics, Computational Physics and Modern Physics. Students will demonstrate written and oral communication skills in communicating physics-related topics. Students will assemble and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes. Students will demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data. Students will demonstrate proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data. Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena. Students will demonstrate an understanding of the impact of physics and science on society

Sanskrit Department

About

Welcome to the webpage of Department of Sanskrit. This department was started with the establishment of MLSM College in 1976.It is a single faculty department.It offers course to undergraduate classes. It relates the students with their culture.

The courses taught in UG Classes are:

Sanskrit Kavya
Sanskrit Gadya Kavya
Upnishadavam Geeta Tatha Paniniya Shiksha
Niti Sahitya
Vyakaran Avam Sanyojan
Patanjal Yogasutra
Bhasha Vigan ke Moolbhut Siddhant

Scope:

By taking this subject students can seek employment in the field of Jyotish, Aacharya, Teaching, Banking Sector, etc. Students can adopt this subject as an optional subject to Indian Civil Service's and Provincial services.

Programme Outcomes of Sanskrit:-

The programee will help you to acquire the following skills as a basis for the study of ancient Indian religion, literature and history through.

• Advanced knowledge of ancient religion, literature and history through the study of Sanskrit text.
• Advanced command of the Sanskrit language through advanced text reading in Vedic Sanskrit.
• Ability to apply relevant theoretical perspective to topics within the field on ancient Indian religion, literature and history through Sanskrit texts.
• Sanskrit studies directed towards relating Indian knowledge systems both to contemporary Indian reality and contemporary western thought.
• Sanskrit is the language of the two great Hindu epics Ramayana and Mahabharata read by people all over the world.

Programme Specific Outcomes of Sanskrit:-

Students of all undergraduate general degree programs at the time of graduation will be able to:-
Students distinguish between Vedic Sanskrit and its descendant, classical Sanskrit, however these two varieties are very similar and differ mostly in a some points of phonology, grammar and vocabulary.
Sanskrit is a highly inflected language which uses suffixes, prefixes, infixes and reduplication to form words and to represent grammatical categories. Many of these categories has been last or simplifies in modern Indo-Aryan language. There are numerous sandhi forms.
In Sanskrit "Man" translate to mind and "tra" means to free from. Mantras are used as a tool to free the mind. Sanskrit mantras use seed sounds that create the actual vibration of the world it translate to.
The best part seed sounds don't have to be said out loud. They may even be more effective when recited silently. To enhance your meditations, you can also visualize the deity which connects to your Mantra or envision healing light while meditating.

List of Courses

Sr. No	Course Code	Course Title
1	**SKT -DSC-101**	संस्कृत काव्य
2	**SKT -DSC-102**	संस्कृत गद्य काव्य
3	**SKT -DSC-103**	नीती साहित्य
4	**SKT –AECC-104**	उपनिषद गीता तथा पाणिनीय शिक्षा
5	**SKT –DSC-203**	व्याकरण एवम संयोजन
6	**SKT -DSC-201**	संस्कृत नाटक
7	**SKT –DSC-202**	संस्कृत व्याकरण
8	**SKT-AEEC-205**	आयुर्वेद के मूल सिद्धान्त
9	**SKT-AEEC-206**	संस्कृत छंद एवम गायन
10	**SKT-DSC-301**	व्यक्तित्व विकास का भारतीय द्रिष्टिकोण
11	**SKT-DSC-302**	साहित्यिक समालोचन
12	**SKT-GE-303**	पांतजल योगसूत्र
13	**SKT-GE-304**	भाषा विज्ञान के मूलभूत सिद्धान्त
14	**SKT-AEEC-305**	भारतीय रंगशाला
15	**SKT-AEEC-306**	भारतीय वास्तु शास्त्र

	Core Course (12)	Ability Enhancement Compulsory Course (AECC)	Ability Enhancement Elective Course/ Skill	Discipline Specific Elective DSE	Generic Elective GE
	12 paper of 6 credits each	**2 paper of 4 credits each**	**4 paper of 4 credits each**	**4 paper of 6 credits each**	**2 paper of 6 credits each**
First Year	English-1 Skt/Hindi/MIL -1 SKT-DSC-103 नीती साहित्य **DSC-1A** SKT-DSC-101 संस्कृत काव्य **DSC-1B** SKT-DSC-102 संस्कृत गद्य काव्य **DSC-2A DSC-2 B**	Environmental studies English-Hindi/Skt (One out of three) SKT-AECC-104 उपनिषद गीता तथा पाणिनीय शिक्षा			
Second Year	English-2 Skt/Hindi/MIL-2 SKT-DSC-203 व्याकरण एवम संयोजन **DSC-1C** SKT-DSC-201 संस्कृत नाटक **DSC- 1D** SKT-DSC-202 संस्कृत व्याकरण **DSC-2 C DSC- 2D**		**SEC-1** SKT-AEEC-205 आयुर्वेद के मूल सिद्धान्त **SEC-2** SKT-AEEC-206 संस्कृत छंद एवम गायन		
Third year			**SEC-3** SKT-AEEC-305 भारतीय रंगशाला **SEC-4** SKT-AEEC-306 भारतीय वास्तु शास्त्र	**DSE-1A** SKT-DSE-301 व्यक्तित्व विकास का भारतीय द्रिष्टिको	**GE-1** SKT-GE-303 पांतजल योगसूत्र **GE-2** SKT-GE— 304 भाषा

				ण **DSE-1B** SKT-DSE-302 साहित्यिक समालोचन **DSE-2 A** **DSE-2 B**	विज्ञान के मूलभूत सिद्धान्त

Course Outcomes of the Courses :-

Sr. No	Course Code	Course Title	Outcomes
1	DSC-101	संस्कृत काव्य	इस विषय का अध्ययन विद्यार्थी को अग्रिम पाठ्यक्रम व साहित्य को पढ़ने के लिए आधार भूमि प्रदान करेगा जिससे विद्यार्थी :- · कवियों और उनके काव्यों से परिचित होगें तथा राजाओं एवम उनकी राज्य की नीतियों के बारे में ज्ञान प्राप्त करेंगे | · नीतिशतकम को पढ़कर बच्चे नीतियों से परिचित होगें तथा रचनाकारों के बारे में तथा उनकी कृतियों के बारे में ज्ञान अर्जित करेगें |
2	DSC-102	संस्कृत गद्य साहित्य	· शुकनासोपदेश को पढ़कर उस समय के समाज,राजनैतिक विचार तथा सूक्तियों के अर्थ एवं उपयोगिता से परिचित होगें | · शिवराजविजयम को पढ़कर गद्य सौष्ठव,कथा वास्तु,घटनाक्रम का समय निर्धारण का ज्ञान प्राप्त करेगें | · गद्यकाव्य के उदभव एवं विकास को पढ़कर गद्यकारो के विषय में और उनकी कथाओं का ज्ञान अर्जित करेगें |
3	DSC-103(MIL)	नीती साहित्य	· विद्यार्थी नीतिशकतम को पढ़कर आचरण,व्यवहार और औचित्य में निपुण हो जायेगें | · पंचतंत्र की कहानिया पढ़कर विद्यार्थियों के मनोरंजन के साथ-2 अच्छी शिक्षा प्राप्त ककर उसे जीवन में प्रयोग लाने में सक्षम होगें | · महाकाव्यों के बारे में पढ़कर उससे सम्बन्धित कवियों के जीवन-वृत,कृतित्व और उनके ग्रंथो के ज्ञान से अवगत होगें | · गद्यकाव्य के विषय में पढ़कर गद्यकारों और गद्य रचनो का ज्ञान प्राप्त करेगें |

			· नाटकों को पढ़कर और उनके नाटकारो के बारे में ज्ञान प्राप्त करेगें | नाटक मनोरंजन के साथ-2 रास निष्पत्ति,भाषाशैली,शिक्षा आदि ज्ञान प्राप्त करेगें
4	AECC-104	उपनिषद गीता तथा पाणिनीय शिक्षा	• Students will learn how to unlock the secrets of this powerful scripture. • Students will know how to recognise the interbattle of life and make the effort that will with it. • Students will know how the law of karma works including the effects of vasanas and sanskaras. • How to overcome desire, anger and attachment. • How to deepen your relationship with God. • It relates them Hindu Dharm and God Prayers. • Upnishad can provide knowledge of sarishti, Karma, Ishwar, Bramha and Aatma. · विद्यार्थी पाणिनीय शिक्षा को पढ़कर उच्चारण - स्थान , प्रयत्न , स्वर काल, सन्धि के विषय में ज्ञान अर्जित करेगें |
5	DSC-203(MIL)	व्याकरण एवम संयोजन	· संज्ञा प्रकरण का ज्ञान प्राप्त करेगें | · समास एवं कृत्य प्रयत्यो का ज्ञान प्राप्त करेगें | · गद्य लेखन तथा अनुवाद करने का ज्ञान प्राप्त करेगें |
6	DSC-201	संस्कृत नाटक	· नाटकों के उदभव एवं विकास तथा संस्कृत नाट्यशास्त्रीय पारिभाषिक शब्दावली से परिचय होगें | · नाटकों को पढ़कर नाटकों की कथावस्तु,काव्यसौष्टव तथा घटनाक्रम का समय समय निर्धारण एवं प्रकृति का मानवीकरण का ज्ञान प्राप्त करेगें |
7	DSC-202	संस्कृत व्याकरण	· संज्ञा प्रकरण का ज्ञान प्राप्त करेगें | ·स्वरसन्धि,व्यंजन संधि तथा विसर्ग संधि को पढ़कर संधि एवं संधि विच्छेद करने में सक्षम होगें | · विभक्ति प्रकरण को पढ़कर वाक्य रचना करना सीखेंगे |
8	AEEC-205	आयुर्वेद के मूल सिद्धान्त	·आयुर्वेद का परिचय,औषधि विज्ञान का चरक पूर्वकालीन इतिहास का ज्ञान प्राप्त करेगें | · चरकसहिंता को पढ़कर षडरितियों के काल-विभाग तथा शरीर एवं प्रकृति को अवस्था से परिचित होगें | · तैत्तिरीयोपनिषद की भृगुवल्ली से परिचित होगें |

9	AEEC-206	संस्कृत छंद एवम गायन	· छंद शास्त्र का ज्ञान प्राप्त क्र चाँदो के प्रकार और तत्व को जान्ने में सक्षम होगें | · वैदिक छंदो का विश्लेषण और गान पद्धति का ज्ञान प्राप्त करेगें | · शास्त्रीय छंदो का विश्लेषण तथा गान पद्धति का ज्ञान अर्जित करेगें |
10	DSE-301	व्यक्तित्व विकास का द्रिष्टिकोण	· ऐतिहासिक द्रिष्टिकोण के बारे में हमारे वेदो तथा उपनिषदों में क्या कहा गया है इससे परिचित होगें | · व्यक्ति की अवधारणा तथा व्यक्तित्व के प्रकारो का ज्ञान प्राप्त करेगें | · व्यवहार सुधार के मापदण्डो के बारे में जान सकेंगे |
11	DSE-302	साहित्यिक समालोचन	· काव्य प्रकाश को पढ़कर काव्य वैष्विष्ट्य,काव्य प्रयोजन,काव्यहेतु,का ज्ञान प्राप्त करेंगें | · शब्द शक्तियों का ज्ञान अर्जित करेगें |
12	GE-303	पांतजल योगसूत्र	· पांतजल योगसूत्र को पढ़कर समाधि का ज्ञान प्राप्त करेगें | · साधन पाद तथा विभूतिपाद से परिचित होगें |
13	GE-304	भाषा विज्ञान के मूलभूत सिद्धान्त	· भाषा विज्ञान और भाषाओं के वर्गीकरण का ज्ञान प्राप्त करेगें | · ध्वनिविज्ञान,स्वरविज्ञान,रूपविज्ञान और अर्थ विज्ञान को जान पायेगें | · वाक्य रचना के विषय में पढ़कर वाक्य रचना करने में सक्षम होगें |
14	AEEC-305	भारतीय रंगशाला	· भारतीय रंगशाला का इतिहास एवं परम्परा तथा इसके निर्माण एवं प्रकारो को पढ़कर इनसे परिचित होगें | · अभिनय,वस्तु,नेता तथा रस के बारे में ज्ञान प्राप्त करेगें |
15	AECC-306	भारतीय वास्तु शास्त्र	भारतीय वास्तु शास्त्र मंगलमय एवं शिल्पादि निर्माणों का आधार है।भारतीय वास्तु शास्त्र को पढ़कर वास्तु प्रयोजन,भूमिपरिक्षण,गृहपरिक्षण,वृक्षारोपण,शिलान्यास,गृहवास्तु का ज्ञान प्राप्त करेंगे ।द्वारज्ञान ,स्वास्तिक ,द्वारफल तथा द्वारवेधफल के बारे मे ज्ञान प्राप्त करेंगे ।

Department of Sociology (Outcomes)
Scope:
By taking this subject student can seek employment in the field of Social Defence, Social Planning, Medical, Social Welfare, Social Projects, Education, etc.

Students can be appointed as a Child Development Officer, Social Welfare Officer, Probation Officer, Labour Officer, teachers in higher education, etc.
Students can adopt this subject as an optional subject to Indian Civil Service's and Provincial Services.
Students of all undergraduate general degree programme at the time of graduation will be able to: -
Critical Thinking: - Apply sociological knowledge to new problems and social issues. Analyze information in relation to course material and previous sociological courses. Propose solutions for problems.
Sociological research methods/techniques: - Demonstrate an understanding quantitative and qualitative and qualitative methods. Appropriately select which method to employ, interpret and analyse data determine the significance of research findings.
Social Theory: - Demonstrate an understanding of sociological theories. Demonstrate an understanding of analyze and evaluate how theories are impacted by social and historical conditions.
Social Institutions: - List, demonstrate an understanding and analyze major social institutions. Demonstrate understanding of analyze evaluate and propose solution to reduce problems within institutions using social justice practice. Analyze and evaluate that how stratification mitigate experiences of individuals with in institutions.
Race, class, Gender: - Define and demonstrate and understanding of race, class and gender inequality. Define and demonstrate, analyze and evaluate and propose improvements to theories of race, class, gender inequality.
Society: - Discuss and understand that how people are interrelated on the basis of social relations and know how to behave in the society in different situations and help them to be a good citizen of the society.
Social Problems: - Think critically about the social problems that how some critical situations disorganise our society and give suggestions to remove these problems and be aware about the various policies and acts made by the government to abolish these problems from the society.

Programme Specific Outcomes of Sociology: -

1. Demonstrate a basic understanding of theoretical paradigms used to study social phenomena and generate research in the field of Sociology.
2. Demonstrate an understanding of the research method process, the various data collections techniques available for conducting research within the social science.
3. Demonstrate an ability to apply sociological concepts and theories to the real world and ultimately their everyday activities.
4. Demonstrate an understanding of the formation and functions of the social institutions that exists in our society.
5. Demonstrate an understanding of the social groups that operate in our development and socializations.
6. Upon completions of BA in Sociology students will be able to

Think critically about the causes and consequences of social inequality.
Design and evaluate empirical sociological research.
Explain and apply the major theoretical prospective in sociology.
Communicate orally and in writing about sociological concepts.
Use their sociological educations outside the classroom, particularly in their career or further education.

Sr.	Course Code	Course Title
1	SCOL 101	Introduction to Sociology
2	SCOL 102	Society in India
3	SCOL 201	Sociological Theories
4	SCOL 202	Methods of Sociological Enquiry
5	SCOL 203	Techniques of Social Research
6	SCOL 204	Sociology of Environment
7	SCOL 301	Social Demography
8	SCOL 302	Theory and Practice of Development
9	SCOL 303	Religion and Society
10	SCOL 304	Marriage, Family and Kinship
11	SCOL 305	Social Stratifications
12	SCOL 306	Gender and Sexuality
13	SCOL 307	Polity and society in India
14	SCOL 308	Economy And Society

SCHEME FOR CBCS SYSTEM IN SOCIOLOGY						
Year	**Course Type**	**CourseName**	**Credits**	**CCA**	**ESE**	**Total Marks**
BA First Year	**DSC-IA**	**Introduction to Sociology**	06	30	70	100
	DSC-2A	**Society In India**	06	30	70	100
BA Second Year	**DSC-1C**	**Sociological Theories**	06	30	70	100
	DSC-2C	**Methods of Sociological Enquiry**	06	30	70	100
	SEC-I	**Techniques of Social Research**	04	30	70	100
	SEC-2	**Sociology of Environment**	04	30	70	100
BA Third Year	**SEC-3**	**Social Demography**	04	30	70	100
	SEC-4	**Theory and Practice of Development**	04	30	70	100
	DSE-1A	**Religion and Society**	06	30	70	100
	DSE-1B	**Social Stratification**	06	30	70	100

COURSE OUTCOMES			
1	**SCOL 101**	**Introduction to Sociology**	• Define sociology and discuss about the nature and significance of sociology • Understand the history of sociology • Discuss about the scope of sociology and describe how sociology is differ from and is similar to other science • Understand the sociological concepts and correlate sociological concepts with their day to day life and give examples
2	**SCOL 102**	**Society in India**	• Define basic concepts and give examples • Discuss about the unity and diversity of India • Show interrelationship and demonstrate the relevance of the concepts such as caste, class, tribes, family and kinship • Discuss about the different movement such as • Dalit's movements, women movements • Understand and discuss about the various policies and programmes that are made for the upliftment of women and Dalits
3	**SCOL 201**	**Sociological Theories**	• Familiar to tje classical sociological thinkers whose work has shaped the discipline of sociology • Understand the role of theory in sociology • Define theory and describe its role in building sociological knowledge • Understand and show how theories reflect the historical and social contexts of times and cultures in which they were develop • Demonstrate an understanding of sociological theories in small groups and to express their nopinions
4	**SCOL 202**	**Methods of Sociological**	• After completion of this course students will be able:- • To understand methods of research

		Enquiry	• To understand research design such as exploratory and descriptive • To understand modes of enquiry
5	**SCOL 203**	**Techniques of Social Research**	• Develop the skill to understand and use techniques employed by social scientists to investigate social phenomena • Emphasis on formulating research design methods of data collection and data analysis • Collect, analyze and interpret qualitative data,derived from interview, observation, questionnaire • Understand the importance of data collection sources • Analyze data through coding, tabulation and interpret research findings. • Describe different methods of data collection
6	**SCOL 204**	**Sociology of Environment**	• Students will be able to understand about the issues related to environmental concern and interrelationship of environment and society
7	**SCOL 301**	**Social Demography**	• Students will be able to understand techniques of • population studies and recent trends in demographic processes • To know social and economic consequeces about poverty, unemployment housing and slums • To know how population growth affecting environment • To know about various population policies in India
8	**SCOL 302**	**Theory and Practice of Development**	• Students will be familiarize with theories of development • To understand recent trends in development • Think critically about the sustainable development
9	**SCOL 303**	**Religion and Society**	• Students will have sociological understanding of religion • They will be able to examine some forms of religion in India and its role in modern society • To understand secularism and communalism
10	**SCOL 304**	**Marriage, Family and Kinship**	After completion of this course students will be able • To understand contemporary concerns in the field of marriage, family and kinship • To discuss about meaning, types and significance of family and household • Critically think about the charging patterns of family, marriage and kinship
11	**SCOL 305**	**Social Stratifications**	After completion of this course students will be able:- • To understand the various ideas of social inequality and their sociological study • To understand different forms of stratification • To understand bases of inequality in pre-modern and modern societies • To understand the meaning and significanceof social mobility
12	**SCOL 306**	**Gender and Sexuality**	• Students will be able:- • To understand gender by interrogating the • categories of gender, sex and sexuality • To understand bases of gender difference

			• and inequalities • To discuss about gender discrimination • To understand complexity of gender • relations in contemporary societies
13	**SCOL 307**	**Polity and society in India**	• Students will be able to understand the meaning, • scope and significance of Indian policies from a • sociological perspective • To discuss about the political institutes such as • government, state, power and authority • To understand political processes like democracy, • bureaucracy and civil society
14	**SCOL 308**	**Economy And Society**	• Students will be able to understand aspects of economic processes • To understand modes of production • To discuss about contemporary issues such as globalisation and sustainable • development • To understand new economic trends such as information, communication, technology, social security and alienation

BACHELOR OF BUSINESS ADMINISTRATION (B.B.A.)

PO's, PSO's & CO's

BACHELOR OF BUSINESS ADMINISTRATION (B.B.A.)

Program Outcomes:-

- To provide adequate basic understanding about Management Education among the students.
- To prepare students to explore opportunities being newly created in the Management Profession
- To train the students in communication skills effectively.
- To develop appropriate skills amongst students so as to make them competent for self-employment.
- To inculcate Entrepreneurial skills.
- Demonstrate understanding of human behavior in organizations and the management of human resources.
- Demonstrate ability to perform managerial tasks involving strategic and cross-functional issues in complex organizations.
- Demonstrate understanding of the key marketing concepts, marketing's role in strategic planning to create and deliver consumer value.
- Demonstrate understanding of the micro environmental and macro environmental forces that affect the firm's ability to serve its customers.
- Demonstrate understanding of why firms engage in international business and why international business growth has accelerated.
- Demonstrate understanding of comparative environmental frameworks, global strategy, structure, and implementation.

Program Specific Outcomes:-

- Students will exhibit understanding of broad business concepts and principles.
- Students will exhibit critical thinking skills to address diverse business challenges and opportunities.
- Students will be able to identify and define problems and opportunities.
- Students will demonstrate problem solving skills by gathering and assessing appropriate information.
- Students will demonstrate use of appropriate techniques to effectively manage business challenges.
- Model business professionalism and demonstrate effective written and oral communication skills.
- Students will be able to effectively communicate management concepts, plans and decisions in oral presentations.
- Students will be able to effectively communicate management concepts, plans and decisions in written reports.
- Students will demonstrate professional conduct within any team activities.

Sr.no	Semester	Course Code	Course Name	Program specific Outcomes
1	**BBA 1st sem**	**101**	**Environment Science**	These courses are the courses based upon the content that leads to Knowledge enhancement and are value-based aimed at providing hands-on-training, competencies, skills etc. in Environment science.
2	**BBA 1st sem**	**102**	**FUNDAMENTAL OF MANAGEMENT & ORGANISATIONAL BEHAVIOUR**	To acquaint the students with the fundamentals of business management and to understand individual and group behavior at work place so as to improve the effectiveness of an organization. The course will use and focus on Indian experiences approaches and cases
3	**BBA 1st sem**	**103**	**STATICS FOR BUSINESS DECISION**	Statistics for Business after growing through this subject people will be understand that how to use the different technique of statistics like Central tendency ,dispersion ,correlation ,regression analysis, time series &probability which can be implemented by them for Research and Analysis different areas. Moreover these techniques will helpful for those preparing their project reports
4	**BBA 1st sem**	**104**	**ENTREPRENEURSHIP DEVELOPMENT**	• Identifying opportunities and Evaluation, Building the team / Leadership strategies planning for business steps in strategies planning Harvesting and Exit strategies. • Introduction to the entrepreneurial process of creating new businesses, role of Creativity and

				innovation in Entrepreneurial start-ups, manage family-owned companies, context of social innovation and social entrepreneurship and issues and practices of financing entrepreneurial businesses.
5	**BBA 2nd sem**	**201**	**Business Communication**	Upon successful completion of this course, the student should be able to: • Apply business communication strategies and principles to prepare effective communication for domestic and international business situations. • Identify ethical, legal, cultural, and global issues affecting business communication. • Utilize analytical and problem solving skills appropriate to business communication. • Participate in team activities that lead to the development of collaborative work skills. • Select appropriate organizational formats and channels used in developing and presenting business messages. • Compose and revise accurate business documents using computer technology.

6	**BBA 2nd sem**	**202**	**MANAGERIAL ECONOMICS**	The purpose of this course is to apply micro economics concept and techniques in evaluating business decisions taken by firms. The emphasis is on explaining how tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternative.
7	**BBA 2nd sem**	**203**	**BUSINESS ACCOUNTING**	To familiarize students with the mechanics of preparation of Financial Statement, understanding corporate financial statement, their analysis and interpretation.
8	**BBA 2nd sem**	**204**	**ETHICS AND CORPORATE SOCIAL RESPOSNSIBILITY**	The objective of this paper is to make the students more clear about the importance of ethics in business and practices of good corporate governance; It also talks about the corporate social responsibility
9	**BBA 3rd sem**	**301**	**Macroeconomics**	This course deals with the principles of macroeconomics. The coverage includes determination of and linkages between major economic variables; level of output and prices, inflation, interest rates and exchange rates. The course is designed to study the impact of monetary and fiscal policy on the aggregate behavior of individuals.
10	**BBA 3rd sem**	**302**	**Principles of Marketing**	This course aims to familiarize students with the marketing function in organizations. It will equip the students with understanding of the Marketing Mix elements and sensitize them to certain emerging issues in Marketing. The course will use and focus on Indian experiences, approaches and

				cases
11	**BBA 3rdsem**	**303**	**MANAGEMENT ACCOUNTING**	To acquaint students with role of Management Accounting in planning, control and decision-making
12	**BBA 3rdsem**	**304**	**INDIA'S DIVERSITY AND BUSINESS**	The objective of the paper is to understand the bases of India's diversity and its linkages with the people, livelihood, occupational diversity and socio-economic challenges. Further, it aims at understanding the diversity and its implications for the business.
13	**BBA 3rdsem**	**305**	**Personality Development & Communication Skills**	The objective of the course is bring about personality development with regard to the different behavioral dimensions that have far reaching significance in the direction of organizational effectiveness.
14	**BBA 4thsem**	**401**	**Business Research**	To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of business marketing research
15	**BBA 4thsem**	**402**	**Human Resource Management**	The objective of this course is to help the students to develop an understanding of the concept & techniques of essential functions of human resource management. The course will use and focus on Indian experiences, approaches and cases
16	**BBA 4thsem**	**403**	**Financial Management**	To acquaint students with the techniques of financial management and their applications for business decision making

17	**BBA 4th sem**	**404**	**Tax Planning**	The objective of this course is to acquaint the students with the tax structure for individuals and corporate and also its implications for planning
18	**BBA 4th sem**	**405**	**IT Tools in Business**	The objective of this course is to acquaint the students with Information Technology tools which includes various Office Automation Tools for individuals and corporate.
19	**BBA 5th sem**	**501**	**Quantitative Techniques for Management**	To acquaint students with the construction of mathematical models for managerial decision situations and to use computer software packages to obtain a solution wherever applicable. The emphasis is on understanding the concepts, formulation and interpretation.
20	**BBA 5th sem**	**502**	**Legal Aspects of Business**	To gain knowledge of the branches of law which relate to business transactions, certain corporate bodies and related matters? Also, to understand the applications of these laws to practical commercial situations.
21	**BBA 5th sem**	**503**	**Investment Banking and Financial Services**	The objective of this paper is to know the different aspects of Investment banking, mergers and acquisition and the detailed SEBI guidelines on issue management
			ConsumerBehaviour	The course of Consumer behavior equips students with the basic knowledge about the issues and dimensions of consumer behavior and with the skill and ability to analyze consumer information and develop consumer behavior oriented marketing strategies

			HRD: Systemsand Strategies	The course gives an overview of the need for HRD and HRD practices which can develop and improve an Organization's systems and strategies leading to an optimal HRD climate
			InternationalTrade: Policiesand Strategies	The paper aims to provide a thorough understanding of the basis for International trade and strategies. The role of the global institutional structure and trade strategies of developing countries and trade partners of India will be studied
22	**BBA 5th sem**	**504**	**Investment Analysis & Portfolio Management**	The aim of this course is to provide a conceptual framework for analysis from aninvestor's perspective of maximizing return on investment – a sound theoretical base withexamples and references related to the Indian financial system
			Retail Management	The primary objective of the course is to have students develop marketing Competencies in retailing and retail consulting. The course is designed to prepare students for Positions in the retail sector or positions in the retail divisions of consulting companies. Besides learning more about retailing and retail consulting, the course is designed to foster the development of the student's critical and creative thinking skills
			Training and Management Development	To familiarize the students with the concept and practice of training and development in the modern organizational setting
			Global Business Environment	To get the students acquainted with the present economic environment in India and abroad. To enable the students

				understand the various issues involved in the macro management of the economy
23		**601**	**Business Policy & Strategy**	To equip students with the necessary inside into designing strategies for an Organization and linking the organizations strategies with the changing environment. The course will focus on Indian cases, approaches and experiences
24		**602**	**Financial Institutions & Markets**	The objective of this paper is to introduce students to the different aspects and Components of financial Institutions and financial markets. This will enable them to take the rational decision in financial environment
25		**603**	**Project Appraisal & Analysis Distribution &** **Or** **Supply Chain Management** **or** **Performance and Compensation Management** **or** **Multinational Business Finance**	To explain identification of a project, feasibility analysis including market, technical and financial appraisal of a project. Understand the relevance of alternative project appraisal techniques, financial structuring and financing alternatives. This course intends to involve students to apply appraisal techniques for evaluating live projects This course would help students develop an understanding about the role of marketing channels, distribution and supply chain, key issues of supply chain and the drivers of supply chain performance. The course would acquaint the students with various concepts To familiarize students about concepts of performance and compensation management and how to use them to face the challenges of attracting, retaining and motivating employees to high performance

				The course has been designed to familiarize the students with International Monetary System and Financial Institutions. Functioning of the Foreign Exchange Markets and Financial Management of a multinational firm will be the essential component of this course.
26		**604**	**(DSE-I Finance) Project Report** **OR** **(DSE-II Marketing) Project Report** **OR** **(DSE-III Human Resource) Project Report** **OR** **(DSE-IV Management of Global Business) Project Report**	

BBA Course Outcomes:-

Sr.no	Semester	Course Code	Course Name	Course Outcomes
1	**BBA 1st sem**	**101**	**Environment Science**	These courses are the courses based upon the content that leads to Knowledge enhancement and are value-based aimed at providing hands-on-training, competencies, skills etc. in Environment science.
2	**BBA 1st sem**	**102**	**FUNDAMENTAL OF MANAGEMENT & ORGANISATIONAL BEHAVIOUR**	• Basic understanding of Management and emerging issues. • Trace the journey of Management as a discipline and develop an understanding about various ideas and concepts given by different people over period of time. • Understanding planning concept and its application in various situations. • Define control its process with different techniques that are used in controlling. • Functioning and organizations and how different organizations are structurally different and the nature of organization. • Description of how people behave in the organisation as individuals and or in groups based on their perception and personality. • A discussion on motivation and leadership with focus

				on what makes people motivated and what great leaders had on different business organization example to be discussed. • Study of group behavior and analysis of interpersonal relationships through description of techniques and transactional analysis. • A detailed discussion on organizational conflict and its management. • A study of organizational change.
3	**BBA 1st sem**	**103**	**STATICS FOR BUSINESS DECISION**	To familiarize the students with various Statistical Data Analysis tools that can be used for effective decision making. Emphasis will be on the application of the concepts learnt.
4	**BBA 1st sem**	**104**	**ENTREPRENEURSHIP DEVELOPMENT**	This course provides solid introduction to the entrepreneurial process of creating new businesses.Be critical thinkers who are capable of identifying business opportunities by using cutting-edge analytical tools and problem-solving skills to start new businesses and implement processes to successfully operate these businesses.
5	**BBA 2nd sem**	**201**	**Business Communication**	Curriculum Objectives/Outcomes: • To understand and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation.

				• To understand the importance of specifying audience and purpose and to select appropriate communication choices. • To understand and appropriately apply modes of expression, i.e., descriptive, expositive, narrative, scientific, and self-expressive, in written, visual, and oral communication. • To participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding. • To understand and apply basic principles of critical thinking, problem solving, and technical proficiency in the development of exposition and argument. • To develop the ability to research and write a documented paper and/or to give an oral presentation.
6	**BBA 2nd sem**	**202**	**MANAGERIAL ECONOMICS**	The purpose of this course is to apply micro economics concept and techniques in evaluating business decisions taken by firms. The emphasis is on explaining how tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternative.

7	**BBA2nd sem**	**203**	**BUSINESS ACCOUNTING**	To familiarize students with the mechanics of preparation of Financial Statement, understanding corporate financial statement, their analysis and interpretation.
8	**BBA 2nd sem**	**204**	**ETHICS AND CORPORATE SOCIAL RESPOSNSIBILITY**	The objective of this paper is to make the students more clear about the importance of ethics in business and practices of good corporate governance; It also talks about the corporate social responsibility.
9	**BBA 3rd sem**	**301**	**Macroeconomics**	This course deals with the principles of Macroeconomics. The coverage includes determination of and linkages between major economic variables; level of output and prices, inflation, interest rates and exchange rates. The course is designed to study the impact of monetary and fiscal policy on the aggregate behavior of individuals.
10	**BBA 3rd sem**	**302**	**Principles of Marketing**	• What is marketing and how important it is for any business organization. • Evaluation of marketing as a concept, understand various factor that make up marketing environment. • A description of market segments based on various criteria with real life examples. • Discussion on four 4p's of marketing what is product, uses& stages of PLC, new product development and branding and packaging. • Understanding how price is fixed for a new product and behavior of

				price overtime including strategies. • To understand the role of various elements of promotion mix in promoting a product & service. • Product /service distribution involving various marketing its intermediaries and the concept of wholesaling and retailing. • Service marketing and its relevance in modern business.
11	**BBA 3rdsem**	**303**	**MANAGEMENT ACCOUNTING**	After studying this subjects student will be understand how to use the tools of Management Accounting for planning controlling and decision making at administrative level student can analyze the concept of cost, budgeting and standard costing also which again can be used by them at their different profession or business sector
12	**BBA 3rdsem**	**304**	**INDIA'S DIVERSITY AND BUSINESS**	Student will identify the complex elements important to members of a diverse cultural group or groups in relation to its/their history, values, politics, economy, or beliefs and practices use models and theories of cultural difference to investigate topics in diversity
13	**BBA 3rdsem**	**305**	**Personality Development & Communication Skills**	The objective of the course is bring about personality development with regard to the different behavioral dimensions that have far reaching significance in the direction of organizational effectiveness.

14	**BBA 4th sem**	**401**	**Business Research**	To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of business marketing research.
15	**BBA 4th sem**	**402**	**Human Resource Management**	The objective of this course is to help the students to develop an understanding of the concept & techniques of essential functions of human resource management. The course will use and focus on Indian experiences, approaches and cases
16	**BBA 4th sem**	**403**	**Financial Management**	To acquaint students with the techniques of financial management and their applications for business decision making.
17	**BBA 4th sem**	**404**	**Tax Planning**	The objective of this course is to acquaint the students with the tax structure for individuals and corporate and also its implications for planning.
18	**BBA 4th sem**	**405**	**IT Tools in Business**	The objective of this course is to acquaint the students with Information Technology tools which includes various Office Automation Tools for individuals and corporate.
19	**BBA 5th sem**	**501**	**Quantitative Techniques for Management**	To acquaint students with the construction of mathematical models for managerial decision situations and to use computer software packages to obtain a solution wherever applicable. The emphasis is on understanding the concepts, formulation and interpretation.

20	**BBA 5th sem**	**502**	**Legal Aspects of Business**	To gain knowledge of the branches of law which relate to business transactions, certain corporate bodies and related matters? Also, to understand the applications of these laws to practical commercial situations.
21	**BBA 5th sem**	**503**	**Investment Banking and Financial Services**	The objective of this paper is to know the different aspects of Investment banking, mergers and acquisition and the detailed SEBI guidelines on issue management.
			Consumer Behavior	The course of Consumer behavior equips students with the basic knowledge about the issues and dimensions of consumer behavior and with the skill and ability to analyze consumer information and develop consumer behavior oriented marketing strategies.
			HRD: Systems and Strategies	The course gives an overview of the need for HRD and HRD practices which can develop and improve an Organization's systems and strategies leading to an optimal HRD climate.
			International Trade: Policies and Strategies	The paper aims to provide a thorough understanding of the basis for International trade and strategies. The role of the global institutional structure and trade strategies of developing countries and trade partners of India will be studied.
22	**BBA 5th sem**	**504**	**Investment Analysis & Portfolio Management**	The aim of this course is to provide a conceptual framework for analysis from an investor's perspective of maximizing return on investment – a sound theoretical base with examples

				and references related to the Indian financial system.
			Retail Management	• The primary objective of the course is to have students develop marketing competencies in retailing and retail consulting. • The course is designed to prepare students for positions in the retail sector or positions in the retail divisions of consulting companies. Besides learning more about retailing and retail consulting, the course is designed to foster the development of the student's critical and creative thinking skills.
			Training and Management Development	• To teach student about concept and practice of training and development in the modern organizational setting.
			Global Business Environment	• To get the students acquainted with the present economic environment in India and abroad. • To enable the students understand the various issues involved in the macro management of the economy

23	**BBA 6th sem**	**601**	**Business Policy & Strategy**	• To equip students with the necessary inside into designing strategies for an organization and linking the organizations strategies with the changing environment. • The course will focus on Indian cases, approaches and experiences.
24	**BBA 6th sem**	**602**	**Financial Institutions & Markets**	The objective of this paper is to introduce students to the different aspects and Components of financial Institutions and financial markets. This will enable them to take the rational decision in financial environment
25	**BBA 6th sem**	**603**	**Project Appraisal & Analysis Distribution &** **Or** **Supply Chain Management** **or** **Performance and Compensation Management** **or** **Multinational Business Finance**	To explain identification of a project, feasibility analysis including market, technical and financial appraisal of a project. Understand the relevance of alternative project appraisal techniques, financial structuring and financing alternatives. This course intends to involve students to apply appraisal techniques for evaluating live projects. This course would help students develop an understanding about the role of marketing channels, distribution and supply chain, key issues of supply chain and the drivers of supply chain performance. The course would acquaint the students with various concepts To familiarize students about concepts of performance and compensation management and how to use them to face the challenges of attracting, retaining and motivating

				employees to high performance.
				The course has been designed to familiarize the students with International Monetary System and Financial Institutions. Functioning of the Foreign Exchange Markets and Financial Management of a multinational firm will be the essential component of this course
26	**BBA 6th sem**	**604**	**(DSE-I Finance) Project Report OR (DSE-II Marketing) Project Report OR (DSE-III Human Resource) Project Report OR (DSE-IV Management of Global Business) Project Report**	

DEPARTMENT OF POLITICAL SCIENCE

Department of Political Science was established in this college at the time of its inception in 1976 when arts classes were started. The department organizes Seminar's, Lecture's and Discussion on the current socio-political Issue's from time to time.

Scope of Political Science: The scope of political science is very vast. It is a integral subject of social science i.e. it concern's with practice and principle's of politics. It is also an analysis and interpretation of political system. Since it covers all aspects of political system of a country, it, therefore has five main branches-political theory, public theory, comparative politics, international relations and public law. Political Science covers a wide area of subject and it provides individual with knowledge of various fields and links him with political system.

Aim and Objective of Political Science: After having the political science degree, a student can look for the future jobs as the Public Administration department, Politics, Marketing fields, NGO's, Law's, Electoral and Polling Politics, Teaching and Campaign Management. International Social Organizations such as WHO, UNICEF and more offer great carriers of prospects for those who want to become political scientist and political researchers. The aims and objective of political science program are as under:-

- Developed depth and breadth of political knowledge essential to the political science degree / program.
- Learned or strengthened their knowledge of, the fundamental of Indian politics and International politics.
- Learned to apply basic political science concepts of current events.
- Communicated on political subject in written, oral and electronic form.
- Applied various political theories and techniques to solving applied problems.
- Written or analytical or research paper on a political topic.
- Taken a core course in Indian politics, world politics and political theory.
- Have examined and composed the essential characteristics of various political systems to Indian political system.
- Explored advanced theories of politics and encouraged to appreciate their importance.

Student graduating with B.A. political science should be able to:-

The term Political Science "Came into existence in 1880 by Herbert Baxter Adams, a professor of history at Johns Hopkins University. Today, it is taught in all the major institute of India and abroad. The study of political science develops not only reasoning and analytical skills, but also communication skills both oral and written. After graduation in political science, a student will be able to pursue own career in various fields. He will be able to apply for civil service examination like UPSC, SSC and State Public Service Commission and Joint Public Service Commission. He is also able to apply for IBPS Bank PO and clerical exam etc. If he is thinking to get a job based on political science then the scope is wide and he can choose from a wide range of job profile like activist, administration in corporate or government or non-profit organizations, on line political

data analyst, public affairs research analyst, public opinion analyst, high school teacher, policy analyst, political communicator, etc.

After Post Graduation, he can opt for NET or SLET. To hold a higher position, he will need at least a master degree in political science. To get into higher level teaching, he will need a Ph. D. A Ph. D student can become a good state Legislator, University Professor, Federal Government analyst, and political scientist. He will be able to writing articles for publications in the newspapers, magazines and journals. He will be able to good advisors to the constitutional posts as the President, the Governor etc.

Programme Outcomes (PO's): Program Learning outcomes are statements that describe what learners will know and be able to do when they graduate from a program. After successful completion of BA programme, the student would have the following attributes:

- The graduate will understand the impact of Arts on Society.
- The graduate will be able to perform job in different fields such as education, banking, LIC, business, public service, politics, policy making, self-employed etc. where qualities of precision, analytical mind, logical thinking, clarity of thought, qualitative and quantitative decision are required.
- The graduate will become successful professional by demonstrating logical and analytical ability.
- The graduate will work and communicate efficiency in inter-disciplinary environment.
- The graduate will become successful to solve the current problems prevailed in the State, National and World level.
- A graduate will become successful social-worker, politician, writer, speaker.
- A graduate will become productive citizens dedicating to serving their communities, their nations and the world.
- Graduate of the BA programme in political science will become life long learners as they become cognizant of the institutions and processes of governance and the policies and historical and current event which shape their lives.

Programme Specific Outcomes (Political Science)(PSO's):

Department of Political Science of Maharaja Lakshman Sen Memorial College Sundernagar trains the students to understand basic concepts of political science such as Liberty, Equality, Justice, liberalism, Marxism, Socialism, Right etc. In this department, education means enrichment of principles of political science along with overall personality development. The outcome is that the students of political science are at par with the best of institutes of the state. As part of the preparation process, the department of political science has adopted the specific outcomes to be achieved are as follows:-

- An ability to apply knowledge of political science with other social sciences.
- An ability to communicate effectively.
- An ability to identify formulates and solves political problems at State, National and International Level.
- The broad education necessary to understand the impact of politics in a global, economic, environmental and social context.

- An ability to use the techniques, skill and ideas necessary for effective leaders.

Course Outcomes (CO's) All graduate having political science as one of the subject will have to clear 33 paper's in which 14 major core course paper of 4 credits each, 10 minor elective course paper of 4 credits each, 6 compulsory course paper of 3 credits each and 3 GI and H course paper of 1 credits each while core/Elective additional course paper would be depend upon his choice which credits will be 4.

RUSA – 2013
CBCS – Syllabus
Major Core Course

1.	BAPOL – 0101	=	Understanding Political Science
2.	BAPOL – 0102	=	Colonialism in India and Constitutional Democracy
3.	BAPOL – 0203	=	Introduction to Comparative Government & Politics
4.	BAPOL – 0204	=	Government in India & its Functioning
5.	BAPOL – 0305	=	Introduction to International politics
6.	BAPOL – 0306	=	Political Theory: Basic Concepts
7.	BAPOL – 0407	=	Political Ideologies
8.	BAPOL – 0408	=	Government & Politics of UK & Switzerland
9.	BAPOL – 0409	=	Society, Economy & Politics in Himachal Pradesh
10.	BAPOL – 0510	=	Modern Indian Political Thought
11.	BAPOL – 0511	=	Constitution, Government & Politics of USA & China
12.	BAPOL – 0512	=	Western Political Thought – I
13.	BAPOL – 0613	=	Western Political Thought – II
14.	BAPOL – 0614	=	Indian Foreign Policy

Minor Core Course

1.	BAPOL – 0101	=	Understanding Political Science
2.	BAPOL – 0204	=	Government in India & its functioning
3.	BAPOL – 0222	=	Emerging Trends in India
4.	BAPOL – 0305	=	Introduction to International Politics
5.	BAPOL – 0323	=	Nationalism in India
6.	BAPOL – 0409	=	Society, Economy & politics in Himachal Pradesh
7.	BAPOL – 0424	=	Grass root Democracy in India
8.	BAPOL – 0511	=	Constitutional Government & Politics of USA & China
9.	BAPOL – 0525	=	International Organizations

Compulsory Paper = BA. Ist, IInd, IIIrd Semester

BAPOL ** 22 & **26 = Constitution of India

Additional Paper

1.	BAPOL – 0415	=	Party System in India
2.	BAPOL – 0516	=	Electoral System & Process in India
3.	BAPOL – 0617	=	Human Rights

4. BAPOL – 0618 = Government & Crisis of Govt. in India
5. BAPOL – 0619 = Regional Politics in India
6. BAPOL – 0620 = Social Movement in India
7. BAPOL – 0621 = India & Her Neighbours

Course Structure

Sem.	No of Papers	Paper Code	Paper Title	Credits	ESE	CCA	Max. Marks	Exam Duration Hours
I	Compulsory Course- I			3	50	50	100	3
	Compulsory Course- II			3	50	50	100	3
	Major Core Course- I	BAPOL-0101	Understanding Political Science	4	50	50	100	3
	Major Core Course -II	BAPOL – 0102	Colonialism in India & Constitutional Democracy	4	50	50	100	3
	Minor Elective Course- I			4	50	50	100	3
	Minor Elective Course- II			4	50	50	100	3
	GI and H Course – I			1				1. ½
	Total			**23**				
II	Compulsory Course- III			3	50	50	100	3
	Compulsory Course- IV			3	50	50	100	3
	Major Core Course- III	BAPOL - 0203	Introduction to Comparative Govt. & Politics	4	50	50	100	3
	Major Core Course -IV	BAPOL – 0204	Govt. in India and its Functioning	4	50	50	100	3
	Minor Elective Course- III			4	50	50	100	3
	Minor Elective Course- IV			4	50	50	100	3
	GI and H Course – II			1				1. ½
	Total			**23**				
III	Compulsory Course- V			3	50	50	100	3
	Compulsory Course- VI			3	50	50	100	3
	Major Core Course- V	BAPOL - 0305	Introduction to International Politics	4	50	50	100	3
	Major Core Course -VI	BAPOL – 0306	Political Theory: Basic Concepts	4	50	50	100	3
	Minor Elective Course- V			4	50	50	100	3
	Minor Elective Course- VI			4	50	50	100	3
	GI and H Course – III			1				1. ½
	Total			**23**				
IV	Major Core Course- VII	BAPOL - 0407	Political Ideologies	4	50	50	100	3
	Major Core Course- VIII	BAPOL - 0408	Govt. & Politics of UK & Switzerland	4	50	50	100	3
	Major Core Course- IX	BAPOL - 0409	Society, Economy & Politics of Himachal Pradesh	4	50	50	100	3
	Minor Elective Course- VII			4	50	50	100	3
	Minor Elective Course- VIII			4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Total			**24**			**600**	
V	Major Core Course- X	BAPOL - 0510	Modern Indian Political Thought	4	50	50	100	3

	Major Core Course- XI	BAPOL - 0511	Constitutional Govt. & Politics of USA & China	4	50	50	100	3
	Major Core Course- XII	BAPOL - 0512	Western Political Thought - I	4	50	50	100	3
	Minor Elective Course- IX			4	50	50	100	3
	Minor Elective Course- X			4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Total			**24**			**600**	
VI	Major Core Course- XIII	BAPOL - 0613	Western Political Thought-II	4	50	50	100	3
	Major Core Course- XIV	BAPOL - 0614	Indian Foreign Policy	4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Core/Elective Course*			4	50	50	100	3
	Total			**28**			**700**	

*Means Additional Paper

Cumulate Credits Category-wise =

Major Core Course	**=**	**56**
Minor Elective Course	**=**	**40**
Compulsory Course	**=**	**18**
GI and H Course	**=**	**03**
Core/Elective Additional Course	**=**	**28**
Total credits	**=**	**145**

Courses in Political Science with Title, Code, Semester and Credits are as follow:-

Semester	Course Code	Title of Course	Course Outcomes
First	BAPOL – 0101	Understanding Political Science	Upon successful completion of the course, the student would be able to understand the meaning of Political Science and its significance. Identify the various relations with political science. Distinguish between State & Society, State and Govt., State & Association. To understand the social contract theory. Knowledge of welfare theory and Marixian theory of the function of state.
	BAPOL – 0102	Colonialism in India and Constitutional Democracy.	In this course, the student should be able to clearly understand the impact of British Colonial Rule in India and different movement started in India from time to time. To study the partition of India. To explain the salient feature's of Indian constitution.

	BAPOL – 0203	Introduction to Comparative Govt. & Politics	After the completion of this course, the student should be able to understand the Nature, Scope and importance of Comparative methods. To study system approach and structural functional approach. Define and distinguish between parliamentary Govt. and Presidential Govt., Federal and Unitary form of Government, Authoritarian and Totalitarian Govt.
Second	BAPOL – 0204	Government in India and its Functioning	In this course, the student should be able to describe how the parliament working in Indian Democracy To study the President of India To explain Supreme Court and High Court. To know the working of Judicial activism To define planning Commission, National Development Council and Finance Commission.
	BAPOL – 0305	Introduction to Inter-nation Politics	After the completion of this course, the student should be able to understand the knowledge of inter-nation politics and its conflict with other states. To study about different approaches in Inter-nation politics. To study merits and demerits of colonialism and new colonialism. To write down procedure of Pacific Settlement To analyze Disarmament and Nuclear-disarmament. To study about Balance of Power.
Third	BAPOL – 0306	Political Theory: Basic Concepts	In this course, the student should be able to study Rights and Property. To understand the concept of Liberty, Equality, Justice and Law. To clearly understand the power, Authority and Legitimacy.
	BAPOL – 0407	Political Ideologies	Upon successful of this course, the student should be able to what is Liberalism and its classification. To evaluate Democracy, Elitist democracy and Pluralist democracy. To write down a note on fabianism and syndicalism. To study the life history and works of Karl Marx. To study about Socialism and its merits and demerits. To know about the rise of fascism.
Fourth	BAPOL – 0408	Government and Politics of UK and Switzerland	In this course, the student should be able to study about the sources of British constitution To study salient features of British Constitution. Identify the reasons for the retention of Monarchy in England (Britain). To know the working of British Parliament. To Understand the role of British Prime-Minister. To clearly understand the political parties and pressure groups of UK and Switzerland. To study direct democracy in Switzerland. To study about federal Assembly (Parliament). To study federal Tribunal, its power & position.
	BAPOL - 0409	Society, Economy	In this course, the student should be able to describe how

		and politics of Himachal Pradesh	the state came into existence. To study main rivers & lakes of Himachal Pradesh. To study about main crops, vegetables, horticulture and fruits found in Himachal Pradesh To explain Tourism policy of Himachal Pradesh To write political parties and pressure groups of Himachal Pradesh. To know about the role of cast in the politics of Himachal Pradesh. To study the PRI's in Himachal Pradesh.
Fifth	BAPOL – 0510	Modern Indian Political Thought	After completion of this course, the student should be able to know about the life sketch of various modern Indian thinkers such as RRMR, Swami Vivekanand, Mahatama Gandhi, Jawahar Lal Nehru, B.R. Ambedkar and Ram Manohar Lohia. To study about the various thought and principles given by them.
	BAPOL – 0511	Constitution, Government and Politics of USA & China	In this course, the student should be able to understand the constitution of both the countries. To understand the theory of Separation of power and checks and balances. To study about the Congress of USA. To study president elections in USA Identify the political parties and pressure groups of USA & China. To explain the features of USA and Chinese constitution. To understand Socio-Economic system of China & USA To write the F.R. and Duties of Chinese people's To define composition, power's and position of NPC, standing committee of NPC and state council of China.
	BAPOL - 0512	Western Political Thought - I	In this course, the student should be able to clearly understand the life sketch of Plato, Aristotle, Machiavelli and Bodin's. To study Plato's theory of justice and philosopher king To study about the revolution theory of Aristotle. To understand Machivelli's view on End and Means. To define Bodin's view on Sovereignty.
Sixth	BAPOL – 0613	Western Political Thought – II	On the completion of this course, the student should be able to understand the life sketch of various thinkers and their views. To study social contract theory. To study the basic idea of J.S. Mill on Liberty. To know the principle's of Marxism and his theory of Surplus value.
	BAPOL - 0614	Indian Foreign Policy	In this course, the student should be able to explain the meaning, nature and role of domestic factors in Indian Foreign Policy To understand the concept of NAM To study Indo-USA, India- China and Indo-USSR relations. To evaluate the India's look East policy.

BA-B.Sc. I, II and III	BAPOL - **22 & **26	Constitution of India	After the completion of this course, the student should be able to understand the Indian Constitution. In Indian Constitution, the student studies F.R., DPSP, Fundamental Duties. To explain working process of parliament. To describe Legislative procedure in Indian Parliament and Amending procedure in constitution. To knowledge of centre-state relations, and federal structure. To describe how Panchayati Raj System function. To study Urban Local bodies.

RUSA - 2016

CBCS BA (Regular) POLITICAL SCIENCE (Template) – 132 Credits

Sem.	**Core Course (12)**	**Ability Enhancement Compulsory Course (AECC)-2**	**Skill Enhancement Course (SEC)-2**	**Discipline Specific Elective (DSE) – 4**	**Generic Elective (GE) - 2**
1st	Eng	(Eng/MIL Communication)/ Environment			
	DSC-1-A-Introduction to Political Theory (POLS101)				
	DSC-2-A-(Any other Subject)				
2nd	MIL	(Eng/MIL Communication)/ Environment			
	DSC-1-B Indian Govt. & Politics-(POLS201)				
	DSC-2-B-(Any Other subject)				
3rd	Eng./MIL		SEC-1-Legislative Support (POLS 302)		
	DSC-1-C-Comparative Govt & Politics(POLS 301)				
	DSC-2-C-(Any other subject)				
4th	Eng/MIL		SEC-2-Public Opinion & Survey Research (POLS 402)		
	DSC-1-D-Introduction to International Politics-(POLS 401)				
	DSC-2-D(Any other subject)				
5th			SEC-3-Democratic Awareness with Legal literacy (POLS 501)	DSE-1A-Option.I-Themes in Comp. Pol. Theory(POLS50	GE-1-Society, Economy & Politics in

				2) /or DSC-1A-OptionII-Admn. & Public Policy (POLS 503) ---------- DSE-2A-(Any other subject)	Himachal Pradesh (POLS 504)
6th			SEC-4-Conflict and Peace Building (POLS601)	DSE-1-B-Option-I-Democracy and Governance(POLS602) DSE-IIB-Option-II-Understanding Globalization(POLS603)	GE-2-Human Rights & Gender Environment(POLS604)

Choice Based Credit System – B.A. Political Science (Regular)

S.N.	Semester – I	Course	Paper	
1.1	Subject – I Pol. Science	Discipline Specific Core	Introduction to Political Theory	DSC-IA
1.2	Subject – II (Any other)	Discipline Specific Core	(2nd Discipline Elective)	DSC-IIA
1.3	English	Core Compulsory		CC
1.4	English / MIL (Communication)/Environmental Science	Ability Enhancement (Compulsory)		AEEC
	Semester – II			
2.1	Subject – I	Discipline Specific Core	Indian Government and Politics	DSC-IB
2.2	Subject – II(Any other)	Discipline Specific Core	(2nd Discipline Elective)	DSC-IIB
2.3	MIL	Core Compulsory		CC
2.4	English / MIL (Communication)/Environmental Science	Ability Enhancement (Compulsory)		AECC
	Semester – III			
3.1	Subject – I Political Science – 3	Discipline Specific Core	Comparative Government and Politics	DSC-IC
3.2	Subject – II(Any other)	Discipline Specific Core	(2nd Discipline Elective)	DSC-IIC
3.3	English	Core Compulsory		CC
3.4	Skill Based – I	Ability Enhancement (Compulsory)	Legislative Support	AEEC(I)
	Semester – IV			
4.1	Subject – I Political Science – 4	Discipline Specific Core	Introduction to International Relations	DSC-ID
4.2	Subject – II(Any other)	Discipline Specific Core	(2nd Discipline Elective)	DSC-IID
4.3	MIL	Core Compulsory		CC
4.4	Skill Based – 2	Ability Enhancement	Public Opinion and	AEEC(2)

		(Elective)	Survey	
	Semester – V			
5.1	Skill Based – 3	Ability Enhancement (Elective)	Democratic Awareness Through Legal Literacy	AEEC(3)
5.2	Discipline Specific Elective Course – I Political Science	(A) Themes in Comparative Political Theory		DSE – I A
		(B) Administration and Public Policy: Concepts and Theories		
5.3	Discipline Specific Elective Course – II	From Second Discipline/Subject		DSE-2A
5.4	Generic Elective – I (Interdisciplinary)		Society, Economy & Politics in Himachal Pradesh	GE-I
		From Second Discipline/Subject Based		
	Semester – VI			
6.1	Skill Based -4	Ability Enhancement (Elective)	Peace and Conflict Resolution	AEEC(4)
6.2	Discipline Specific Elective Course –I Political Science	A) Democracy and Governance		DSE –IB
6.3	Discipline Specific Elective Course – II	B) From Second Discipline Subject		DSE -2B
6.4	Generic Elective –II (Interdisciplinary) Any one	Human Rights Gender and Environment		GE – II
		From Second Discipline Based		

Note:- The DSEII / Any other subject once opted by the candidate shall not be changed like Core subject.

SEMESTER-WISE COURSES, CODES AND CREDITS FOR CHOICE BASED CREDIT SYSTEM (CBCS)- BA POLITICAL SCIENCE

CORE COURSES = DISCIPLINE SPECIFIC COURSE (DSC-4)

S.N.	Course	Course Name	Sem.	Course Code	Credits	Maximum Marks		
						ESC	CCA	Total Marks
1.	Political Science	Introduction to Political Theory	I	POLS101	6(L-5,T-1)	70	30	100
2.	Political Science	Indian Govt. & Politics	II	POLS 201	6(L-5,T-1)	70	30	100
3.	Political Science	Comparative Govt. & Politics	III	POLS301	6(L-5,T-1)	70	30	100
4.	Political Science	Introduction to International Politics	IV	POLS401	6(L-5,T-1)	70	30	100
SKILL ENHANCEMENT COURSES(SEC-2): ANY FOUR, ONE PAPER EACH IN III, IV,V & VI SEMESTER								
1.	Political Science	Legislative Support	III	POLS302	6(L-5,T-1)	70	30	100
2.	Political Science	Public Opinion & Survey Research	IV	POLS402	6(L-5,T-1)	70	30	100

3.	Political Science	Democratic Awareness with Legal Literacy	V	POLS501	6(L-5,T-1)	70	30	100
4.	Political Science	Conflict and Peace Building	VI	POLS601	6(L-5,T-1)	70	30	100
DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-2) : ANY TWO PAPERS, ONE PAPER EACH IN V & VI SEMESTER								
1.	Political Science	Themes in Comparative Political Theory Or Administrative Public Policy	V	POLS502	6(L-5,T-1)	70	30	100
				POLS503	6(L-5,T-1)	70	30	100
2.	Political Science	Democracy and Governance Or Understanding Globalization	VI	POLS602	6(L-5,T-1)	70	30	100
				POLS603	6(L-5,T-1)	70	30	100
GENERIC ELECTIVE (GE-2, INTERDISCIPLINARY): ANY TWO PAPERS, ONE PAPER EACH IN V & VI SEMESTER								
1.	Political Science	Society, Economy & Politics in Himachal Pradesh	V	POLS504	6(L-5,T-1)	70	30	100
2.	Political Science	Human & Gender Environment	VI	POLS604	6(L-5,T-1)	70	30	100

Revised Syllabus, CBCS – RUSA 2016

Semester	Course Code	Title of Course	Course Outcomes
First	DSC-I-A-POLS 101	Introduction to Political Theory	After the completion of this course, the student should be able to define politics and distinguish between traditional and modern politics. To understand the concept of Liberty, Equality, Justice and Rights. To study about democracy. To study state intervene in the family.
Second	DSC-I-B-POLS 201	Indian Government and Politics	On the completion of this course, the student should be able to understand the different approaches in Indian Politics. Describe how the Indian Parliament working. To study caste, class, religion and Secularism. To study about political party and party system in India.
Third	DSC-I-C-POLS301	Comparative Government and Politics	After the completion of this course, the student should be able to describe comparative politics and comparative method. To study differentiate between Parliamentary Government & Presidential Government, Authoritarian Govt. & Democratic Govt. To study Unitary and Federal Govt. To explain the main feature's of Federal system in Canada and Unitary system in China. To understand election and different method of election. To study merit and demerits of political parties.
	SEC-I-POLS302	Legislative Support	On the completion of this course, the student should be able to define Rural and Urban (Local) Government. To describe how does a bill become Law in the Parliament. To study about State Legislature and the Parliament. To study different Legislative Committee. To describe how the Budget Pass.
	DSC-I-D-POLS401	Introduction to International Politics	This course trains the student to how to analyze different approaches in International Relations and their importance. To study about cold war

Fourth			To understand the cold war era and Emergine centre of power To study Indian Foreign policy and policy of non-alignment.
	SEC-2-POLS402	Public Opinion and Survey Research	On the completion of this course, the student should be able to understand the meaning of Public Opinion and their role in democracy. To discuss various sample based studies such as Random, Non-Random and Stratified Sampling. To study about survey research through interview and questionnaire methods. To write analysis and interpretation.
Fifth	SEC-3-POLS501	Democratic Awareness with Legal Literacy	After the completion of this course, the student should be able to clearly understand the legal system in India and How it works on Dowry system, Sexual harassment and violence against women, consumer rights and cyber crimes.
	DSE:I-A(Option-1)-POLS502	Themes in Comparative Political Theory	In this course, the student should be able to understand main feature's and differentiate Indian and Western political thought. To study John Locke's views on Rights, J.S.Mill views on Liberty, Kautilya's views on state, Tilak and Gandhi ji views on Swaraj, Ambedkar and Lohia views on social justice, and Deendyal Upadhay views on integrated Humanism.
	DSE:I-A(Option-2)-POLS503	Administration and Public Policy: Concepts and Theories	In this course, the student should be able to study meaning, scope and significance of public administration and differentiate between public and private administration. To understand public policy. To know the working process of policy formulation. To study elements and politics of Development Administration.

Sixth	SEC-4-POLS601	Conflict and Peace Building	On the completion of this course, the student should be able to understand the meaning of conflict and Peace Building. To identify various types of conflicts. To explain the Local, National and International Level of conflicts. To study to resolve conflicts.
	DSE-I-B(option-1)-POLS602	Democracy and Governance	After completion of this course, the student should be able to apply knowledge of the basic structure and process of Governance of Union (President, PM and Supreme Court) and (Governor, CM and High Court) Level. To study Political Communication. To study about role of Trade Union and Farmers. To clearly about New Social Movement (Gender, Tribe, Environment) and NGO's.
	DSE-I-B(option-2)-POLS603	Understanding Globalization	This course develops the capability of the student to understand the Nature and meaning of Globalization and various dimensions of Globalization. To study contemporary world Actors: UNO, G-77 and WTO. To solve different problems of Poverty, Inequality, International Terrorism. To study Global Environmental issues such as Global Warming & Bio-Diversity.
Fifth	GE-1:POLS504	Society, Economy and Politics of Himachal Pradesh	In this course, the student should be able to describe how the state came into existence. To study main rivers & lakes of Himachal Pradesh. To study about main crops, vegetables, horticulture and fruits found in Himachal Pradesh To explain Tourism policy of Himachal Pradesh To write political parties and pressure groups of Himachal Pradesh. To know about the role of cast in the politics of Himachal Pradesh. To study the PRI's in Himachal Pradesh.
Sixth	GE-II: POLS604	Human Rights, Gender and Environment	On the completion of this course, the student should be able to understand the meaning and scope of Human Rights. To study the role of National Human Rights. To analyze structures of patriarchy. To identify various issues of women's political participation and representation in India. Knowledge of certain environmental policy in India.

New Revised Syllabus, CBCS – Annual System 2018

Year	Course Code	Title of Course	Course Outcomes
First Year	DSC-I-A-POLS 101	Introduction to Political Theory	After the completion of this course, the student should be able to define politics and distinguish between traditional and modern politics. To understand the concept of Liberty, Equality, Justice and Rights. To study about democracy. To study state intervene in the family.
	DSC-I-B-POLS 102	Indian Government and Politics	On the completion of this course, the student should be able to understand the different approaches in Indian Politics. Describe how the Indian Parliament working. To study caste, class, religion and Secularism. To study about political party and party system in India.
Second Year	DSC-I-C-POLS201	Comparative Government and Politics	After the completion of this course, the student should be able to describe comparative politics and comparative method. To study differentiate between Parliamentary Government & Presidential Government, Authoritarian Govt. & Democratic Govt. To study Unitary and Federal Govt. To explain the main feature's of Federal system in Canada and Unitary system in China. To understand election and different method of election. To study merit and demerits of political parties.
	DSC-I-D-POLS202	Introduction to International Relations	This course trains the student to how to analyze different approaches in International Relations and their importance. To study about cold war To understand the cold war era and Emergine centre of power To study Indian Foreign policy and policy of non-alignment.
	SEC-I-POLS203	Legislative Support	On the completion of this course, the student should be able to define Rural and Urban (Local) Government. To describe how does a bill become Law in the Parliament. To study about State Legislature and the Parliament. To study different Legislative Committee. To describe how the Budget Pass.
	SEC-2-POLS204	Public Opinion and Survey Research	On the completion of this course, the student should be able to understand the meaning of Public Opinion and their role in democracy. To discuss various sample based studies such as Random, Non-Random and Stratified Sampling. To study about survey research through interview and questionnaire methods. To write analysis and interpretation.
Third Year	DSE:I-A(Option-1)- POLS301(A)	Themes in Comparative Political Theory	In this course, the student should be able to understand main feature's and differentiate Indian and Western political thought. To study John Locke's views on Rights, J.S.Mill views on Liberty, Kautilya's views on state, Tilak and Gandhi ji views on Swaraj, Ambedkar and Lohia views on social justice, and Deendyal Upadhay views on integrated Humanism.

	DSE:I-A(Option-2)-POLS301(B)	Administration and Public Policy: Concepts and Theories	In this course, the student should be able to study meaning, scope and significance of public administration and differentiate between public and private administration. To understand public policy. To know the working process of policy formulation. To study elements and politics of Development Administration.
	DSE-I-B(option-1)- POLS302(A)	Democracy and Governance	After completion of this course, the student should be able to apply knowledge of the basic structure and process of Governance of Union (President, PM and Supreme Court) and (Governor, CM and High Court) Level. To study Political Communication. To study about role of Trade Union and Farmers. To clearly about New Social Movement (Gender, Tribe, Environment) and NGO's.
	DSE-I-B(option-2)- POLS302(A)	Understanding Globalization	This course develops the capability of the student to understand the Nature and meaning of Globalization and various dimensions of Globalization. To study contemporary world Actors: UNO, G-77 and WTO. To solve different problems of Poverty, Inequality, International Terrorism. To study Global Environmental issues such as Global Warming & Bio-Diversity.
	SEC-3-POLS303	Democratic Awareness with Legal Literacy	After the completion of this course, the student should be able to clearly understand the legal system in India and How it works on Dowry system, Sexual harassment and violence against women, consumer rights and cyber crimes.
	SEC-4-POLS304	Conflict and Peace Building	On the completion of this course, the student should be able to understand the meaning of conflict and Peace Building. To identify various types of conflicts. To explain the Local, National and International Level of conflicts. To study to resolve conflicts.
	GE-1:POLS305	Society, Economy and Politics of Himachal Pradesh	In this course, the student should be able to describe how the state came into existence. To study main rivers & lakes of Himachal Pradesh. To study about main crops, vegetables, horticulture and fruits found in Himachal Pradesh To explain Tourism policy of Himachal Pradesh To write political parties and pressure groups of Himachal Pradesh. To know about the role of cast in the politics of Himachal Pradesh. To study the PRI's in Himachal Pradesh.
	GE-II: POLS306	Human Rights, Gender and Environment	On the completion of this course, the student should be able to understand the meaning and scope of Human Rights. To study the role of National Human Rights. To analyze structures of patriarchy. To identify various issues of women's political participation and representation in India. Knowledge of certain environmental policy in India.

The outcomes of all the courses is to impart / provide wide knowledge of political science to the students. Because Political Science is a vast and interesting subject which is taught in all school, colleges, University, institution and worlds. This subject develops the capability of student to use their knowledge in different fields.

Attainment of Program Outcome:-

(Broad Curricular Components that contribute towards the attainment of the programme educational objectives.)

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 requirement of stakeholders and all-in-all move towards the attainment of department as well as university level.

Administrative System helps in ensuring the achievement of PSO's

- Regular developmental meetings are held which is presided by principal and all agenda of improvement of academics are discussed to achieve the PSO's.
- 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 change to the university as and when required.

The POs, PSOs and COs objectives are determined and evaluated through a Regular Examinations Process, Class Tests, Seminars, Assignments, Viva-Voice and Consultation that involve four core constituents: Students, Alumni, PTA and Faculty.

Student input is obtained through student feedback, student evaluation forms, individual faculty- student advise interaction, interviews and interaction with college student central association (CSCA).

Alumni / PTA input is obtained through regular meeting with Alumni / PTA representatives and exit surveys with graduating students.

Student input is taken on regular basis at the

end of each semester. Attainment of each of the

PSO's and CO's can be judged from the

following:

- Increase in pass percentage of student.
- Percentage of student qualifying BA Political Science and other competitive exam is increasing.

- Rise in the number of student going for PG programmes in required institution in the state.
- Increase in number of student for different placement after the completion of the degree programme.

Percentage of failures in different courses is reducing after

इतिहास विभाग "महाराजा लक्ष्मण सेन स्मारक महाविद्यालय, सुन्दरनगर"

किसी भी समाज या देश के लिए उसके इतिहास का महत्व अमूल्य है । इतिहास के ज्ञान के बिना कोई राष्ट्र या जाति उन्नति नहीं कर सकती । इतिहास के माध्यम से मनुष्य वर्तमान या फिर भविष्य में होने वाली गलतियों को सुधारता है । वास्तव में भूतकाल का उतना ही महत्व है, जितना वर्तमान काल का। अपने अतीत को जाने बिना हमारी स्थिति एक मूक पशु के समान होती है, क्योंकि अनेक ऐसी समस्यांए है जो आज हमें उद्विग्न करती हैं, उनके कारण अतीत में ही निहित है। अतः अतीत के अध्ययन का महत्व वर्तमान को भली प्रकार से जानने की क्षमता प्रदान करता है, और भविष्य के सम्बन्ध में दिशा निर्देश भी देता है ।

PROGRAMME OUTCOME

विद्यार्थी इतिहास का अध्ययन करने के पश्चात् क्या कर सकते है :-

1. कला स्नातक करने के पश्चात् विभिन्न क्षेत्रोंए प्रशासनिक सेवाओं, शिक्षा तथा सरकार के विभिन्न विभागों में रोजगार प्राप्त कर सकता है ।
2. व्यावस क्षेत्र में तर्क, विर्तक के योग्य बनाता है ।
3. कला.स्नातक एक अच्छा समाज.सुधारक, प्रवक्ता, लेखक तथा इतिहासकार बन सकता है ।
4. कला.स्नातक अपने राज्य, देश और विश्व का अच्छा नागरिक बन सकता है ।
5. कला.स्नातक की उपाधि प्राप्त करने के पश्चात् वह एक अच्छा इतिहासकार बन सकता है।

महाराजा लक्ष्मण सेन स्मारक महाविद्यालय, सुन्दरनगर के इतिहास विभाग में विद्यार्थियों को इतिहास के विषय में आधारभूत जानकारी प्रदान की जाती है । महाविद्यालय में विद्यार्थियों को प्राचीन इतिहास, मध्यकालीन इतिहास और आधुनिक इतिहास के विषय में जानकारी प्रदान की जाती है ।

इतिहास का अध्ययन करने के पश्चात् विद्यार्थी विभिन्न क्षेत्रों में अपनी योग्यता का प्रदर्शन कर सकते है :-

1. इतिहास का अध्ययन करने के पश्चात् विद्यार्थी एक प्रभावशाली वक्ता बन सकता है
2. इतिहास का अध्ययन करने के पश्चात् विद्यार्थी में एक अच्छे इतिहासकार के गुणों का समावेश हो सकता है ।
3. इतिहास का अध्ययन करने के पश्चात् विद्यार्थी में विभिन्न समस्याओं का समाधान करने की योग्यता होगी।

इतिहास के विषय का अध्ययन करने के पश्चात् रोजगार के अनेक अवसर और पथ उपलब्ध है:-

1. इसमें सबसे सुनहरा अवसर है भारतीय प्रशासनिक सेवा। भारतीय प्रशासनिक सेवा में इतिहास विषय को एक प्रमुख विषय के रूप में रखा गया है।
2. राज्यों के प्रशासनिक सेवा आयोग में भी इतिहास को मुख्य विषय के रूप में रखा गया है।
3. विश्वविद्यालयों, महाविद्यालयों तथा विद्यालयों में इतिहास एक महत्वपूर्ण विषय के रूप में पढ़ाया जाता है । अतः इतिहास अध्ययन का कार्य एक महत्वपूर्ण कार्य है।
4. भारत सरकार द्वारा स्थानित पुरातत्व खोज सम्बन्धी विभाग जहां इतिहास से सम्बन्धित खोज का कार्य किया जाता है । हमें इतिहासकार बनने का अवसर प्रदान करता है ।
5. इन सबके अतिरिक्त राज्य और केन्द्र सरकार के विभिन्न विभागोंमें विभिन्न पदों के लिए होने वाली प्रतियोगी परिक्षाओं में भी इतिहास से सम्बन्धित प्रश्न पुछे जाते है। अतः इतिहास मानव जीवन का एक महत्वपूर्ण अंग है।

BA-I	**HIST (A-101)**	**History of India from earliest times upto 300 CE**	1. इस विषय का अध्ययन करने से विद्यार्थियों को प्राचीन भारतीय इतिहास के अध्ययन में आने वाली समस्याओं तथा प्राचीन भारतीय इतिहास के विभिन्न स्त्रोतों की जानकारी प्राप्त होगी । 2. इस विषय का अध्ययन करने से विद्यार्थियों को पाषाण काल, पाम्रपाषाण काल तथा सिन्धु सभ्यता की जानकारी प्राप्त होगी । 3. इस विषय के अध्ययन से विद्यार्थियों को प्रादेशिक राज्यों, मगध के उत्थान और मौर्य साम्राज्य के विषय में जानकारी प्राप्त होगी । 4. इस विषय का अध्ययन करने से विद्यार्थियों को जैन तथा बौद्ध धर्म के उदय के कारणों, सिद्धान्तों और विकास की जानकारी प्राप्त होगी ।
BA-I	**HIST (A-102)**	**History of India from 300 -1206**	1. इस विषय का अध्ययन करने से विद्यार्थियों को गुप्त वंश के उत्थान, विकास और गुप्त काल को प्राचीन भारतीय इतिहास का स्वर्ण युग क्यों कहा जता है, इसके विषय में जानकारी प्राप्त होगी । 2. इस विषय का अध्ययन करने से विद्यार्थियों को हर्ष वर्धन और राजपूतों के उदय के विषय में जानकारी प्राप्त होगी । 3. इस विषय का अध्ययन करने से विद्यार्थियों को राष्ट्रकुट, पात, प्रतिहार के राजनीतिक ढाँचे और दक्षिण राज्यों के विषय में जानकारी प्राप्त होगी । 4. इस विषय का अध्ययन करने से विद्यार्थियों को सिन्धू में अरबों के आक्रमण और उत्तरी भारत में सत्ता के सघर्ष तथा सलतनत की स्थापना की जानकारी प्राप्त होगी ।
BA-II	**HIST (A-203)**	**History of India from 1206 -1707 AD**	1. इस विषय का अध्ययन करने से विद्यार्थियों को दिल्ली सलतनत की स्थापना विस्तार और सलतनत काल में शासन करने वाले विभिन्न राजवर्शो की जानकारी प्राप्त होगी । 2. इस विषय का अध्ययन करने से विद्यार्थियों को भक्ति एवं भक्ति आंदोलन के उदय के कारणों और प्रभावों की जानकारी प्राप्त होगी । 3. इस विषय का अध्ययन करने से विद्यार्थियों को प्रान्तीय राज्यों तथा द्वितीय अफगान राज्य की स्थापना की जानकारी प्राप्त होगी । 4. इस विषय का अध्ययन करने से विद्यार्थियों को भारत में मुगल साम्रज्य की स्थापना तथा मराठों के उत्थान के विषय में जानकारी प्राप्त होगी ।
BA-II	**HIST (A-204)**	**History of India from 1707 -1947 AD**	1. इस विषय का अध्ययन करने से विद्यार्थियों को **1707** ईण में औरगंजेब की मृत्यु के पश्चात् मुगल साम्राज्य के पतन की ओर अग्रसर होने की जानकारी प्राप्त होती है । 2. इस विषय का अध्ययन करने से विद्यार्थियों को भारत में ब्रिटिश साम्राज्य की स्थापनाए उनकी भू.राजस्व सम्बन्धी नीति और औद्योगिक नीति की जानकारी प्राप्त होती है । 3. इस विषय का अध्ययन करने से विद्यार्थियों को पश्चिमी शिक्षा, प्रैस के विकास तथा सामाजिक और धार्मिक आन्दोलनों की जानकारी प्राप्त होगी । 4. इस विषय का अध्ययन करने से विद्यार्थियों को **1857** ई की क्रान्ति, राष्ट्रीय कांग्रेस उदय, राष्ट्रीय आन्दोलनए गांधी वादी युग और भारत विभाजन की जानकारी प्राप्त होगी ।

BA-II	**HIST (A-213)**	**HISTORICAL TOURISM**	1. इस विषय को अध्ययन करने से विद्यार्थियों को पर्यटन, विरासत, भारत में कला, वास्तुकला, मन्दिर वास्तुकला तथा स्तूप वास्तुकला की जानकारी प्राप्त होगी। 2. इस विषय का अध्ययन करने से विद्यार्थियों को ईरानी वास्तुकला, हिमाचल मन्दिर निर्माण कला तथा औपनिवेशिक वास्तुकला की जानकारी प्राप्त होगी। 3. इस विषय का अध्ययन करने से विद्यार्थियों को हिमाचल में पर्यटन तथा लोकप्रिय पर्यटन स्थल :- शिमला, कुल्लु, मनाली आदी की जानकारी प्राप्त होगी।
BA-II	**HIST (A-215)**	**AN INTRODUCTION TO ARCHAEOLOGY**	1. इस विषय का अध्ययन करने से विद्यार्थियों को भारत में पुरातत्व का उद्भव, विकास, पुरातात्विक स्थल तथा प्रमुख पुरातत्ववेताओं की जानकारी प्राप्त होगी। 2. इस विषय का अध्ययन करने से विद्यार्थियों को पुरातात्विक सिद्धान्त तथा पुरातत्व विज्ञान की अन्य शाखाओं की जानकारी प्राप्त होगी। 3. इस विषय का अध्ययन करने से विद्यार्थियों को वर्गीकरण, प्रकाशन, पवुरातात्विक प्रोद्यौगिकी समाज, व्यापार, मुद्राशास्त्र तथा पुरालेखशास्त्र की जानकारी प्राप्त होगी। 4. इस विषय का अध्ययन करने से विद्यार्थियों को सर्वेक्षण विधि, उत्खनन की तकनीक तथा हिमाचल प्रदेश के पुरातत्व स्थल नगरकोट (कागडां) की जानकारी प्राप्त होगी।
BA-III	**HIST (A-305)**	**HISTORY OF THE MODERN AND CONTEMPORARY WORLD-I [1897-1919]**	1. इस विषय का अध्ययन करने से विद्यार्थियों की सामन्तवाद के पतन, आधुनिक युग का उदय, आधुनिक, समकालिन इतिहास की विशेषताएं, इटली, जर्मनी का एकीकरण, साम्राज्यवादी प्रतिस्पर्धा, समाजिक तनाव तथा समाजवादी आंदोलन की जानकारी प्राप्त होगी। 2. इस विषय का अध्ययन करने से विद्यार्थियों को गृह युद्ध के बाद संयुक्त राज्य अमेरिका उत्थान, जापान का विश्व शक्ति के रूप में उत्थान, चीन में राष्ट्रकी जानकारी प्राप्त होगी। 3. इस विषय का अध्ययन करने से विद्यार्थियों को रूस, जापान युद्ध, 1905-1917 की रूसी क्रान्ति, यूरोप में नए सूर्य का उदय की जानकारी प्राप्त होगी। 4. इस विषय का अध्ययन करने से विद्यार्थियों को इग्लैण्ड - जर्मन शत्रुता, प्रथम विश्व युद्ध तथा शान्ति समझौते की जानकारी प्राप्त होगी।
BA-III	**HIST (A-307)**	**HISTORY OF THE MODERN AND CONTEMPORARY WORLD-II [1919-1992]**	1. इस विषय का अध्ययन करने से विद्यार्थियों को वर्साय से लोकार्नो की संधियों तक, राष्ट्र संघ, 1919-1939 के बीच फ्रास, सोवियत संघ, ब्रिटेन, तुर्की व सयुक्त राज्य अमेरिका के आतरिक विकास की जानकारी प्राप्त होगी। 2. इस विषय का अध्ययन करने से विद्यार्थियों को 1929 ई. की आर्थिक महा मंदी, द्वितीय विश्व युद्ध, कुटनीति, तानाशाही, राज्यों की पराजय, राष्ट्रीय आंदोलन उपनिवेशों का अन्त, सयुक्त राष्ट्र संघ की जानकारी प्राप्त होगी। 3. इस विषय का अध्ययन करने से विद्यार्थियों को 1947 ई. की चीनी क्रान्ति, शीत युद्ध, नाटो, सीटो और वारसा पैक्स की जानकारी प्राप्त होगी। 4. इस विषय का अध्ययन करने से विद्यार्थियों को गुट निरपेक्षता, वैश्वीकरण, नारीवाद, मानवाधिकारों की जानकारी प्राप्त होगी।
BA-III	**HIST (A-317)**	**INDIAN HISTORY AND CULTURE**	1. इस विषय का अध्ययन करने से विद्यार्थियों को भारतीय सांस्कृतिक परंपराओं, रीतियों, भारतीय इतिहास अवलोकन, औषधीय पौधों, जल स्त्रोतों की जानकारी प्राप्त होगी। 2. इस विषय का अध्ययन करने से विद्यार्थियों को शहरीकरण, सामाजिक भेदभाव, संचार और भारत में लैंगिक असमानता की जानकारी प्राप्त होगी। 3. इस विषय का अध्ययन करने से विद्यार्थियों को प्राचीन काल से वर्तमान तक

			महिलाओं की स्थिति, महिलाओं के खिलाफ हिंसा, श्रम में महिलाओं की भागीदारी की जानकारी प्राप्त होगी। 4. इस विषय का अध्ययन करने से विद्यार्थियों को सास्कृतिक विरासत, निर्मित विरासत और भारत के त्यौहारों तथा मेलों की जानकारी प्राप्त होगी।
BA-III	**HIST (A-319)**	**INTRODUCTION TO INDIAN ART**	1. इस विषय का अध्ययन करने से विद्यार्थियों को विभिन्न कलाओं के मूल्याकंन, भारतीय मूर्तिकला, प्रतिमा विज्ञान, हिन्दू, बौद्ध तथा जैन की जानकारी प्राप्त होगी। 2. इस विषय का अध्ययन करने से विद्यार्थियों को प्राचीन काल से लेकर ब्रिटिश काल तक स्थापत्य कला, नागर द्रविड़ और वेसर मन्दिर वास्तु कला की जानकारी प्राप्त होगी। 3. इस विषय का अध्ययन करने से विद्यार्थियों को मस्जिदों, मकबरों, मसरूर रॉक कट मन्दिर, शिमला औपनिवेशिक वास्तुकला तथा भारतीय चित्रकला की जानकारी प्राप्त होगी। 4. इस विषय का अध्ययन करने से विद्यार्थियों को अजंता मिभि चित्रकला, मुगल लघु चित्रकला, महाड़ी चित्रकला गुलेर तथा कांगड़ा शैली की जानकारी प्राप्त होगी।