PROGRAM: BACHELOR OF SCIENCE (B. SC.)

PROGRAM OUTCOMES (POs)

At the end of the Program students will be able to:	
PO 1	**Identify, formulate** and **analyse** scientific problems.
PO 2	**Analyze** and **interpret** data and draw valid conclusions.
PO 3	**Communicate** effectively.
PO 4	**Develop** ethical principles and commit to professional ethics and responsibilities.
PO 5	**Acquire** skills for employment in industry or government or Education sector.
PO 6	**Apply** the Knowledge and Skills acquired during the course in industry and teaching.

PROGRAM SPECIFIC OUTCOMES (PSOs)

B.SC. – CHEMISTRY (HONOURS)

At the end of the Program students will be able to:	
PSO 1	**Develop** knowledge about the scientific concepts and theories.
PSO 2	**Assess** the properties of all the elements
PSO 3	**Apply** appropriate techniques for the qualitative and quantitative analysis.
PSO 4	**Identify** causes of environmental pollution.
PSO 5	**Develop** scientific approach and analytical skills using chemical principles.

B.SC. – COMPUTER SCIENCE (HONOURS)

At the end of the Program students will be able to:	
PSO 1	**Analyse** and **Solve** a complex computing problem.
PSO 2	**Implement** software systems that meet specified design and performance requirements.
PSO 3	**Work** effectively in teams to design and implement solutions to computational problems.
PSO 4	**Communicate** effectively.
PSO 5	**Recognize** the social and ethical responsibilities of a professional working in the discipline.

B.SC. – ELECTRONICS (HONOURS)

At the end of the Program students will be able to:	
PSO 1	**Use/Operate/Design/Troubleshoot** and **Repair** Power Electronics/Biomedical and Pharmaceutical Instruments.
PSO 2	**Develop, Maintain** and **Troubleshoot** Computer hardware/Software and Computer Networks.
PSO 3	**Design, Build** and **Test** analog, digital Electronics, Industrial Automation based Systems and Embedded Systems.
PSO 4	**Apply** main features of the Software and Program Development Environment in higher learning.

B.SC. – MATHEMATICS AND STATISTICS (HONOURS)

At the end of the Program students will be able to:	
PSO 1	**Perform** mathematical computations.
PSO 2	**Write** proofs of the theorems.
PSO 3	**Use** software to solve mathematical problems.

B.SC. – GEOLOGY (HONOURS)

At the end of the Program students will be able to:	
PSO 1	
PSO 2	
PSO 3	
PSO 4	
PSO 5	

COURSE OUTCOMES (COs)

SEMESTER-I	
1. CHEMISTRY: CHC 101 (Inorganic and Organic Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Draw** the probability curves, shapes of orbitals and the molecular geometry.
CO 2	**Apply** the principles in filling of electrons in orbitals and **write** the electronic configuration of atoms and ions.
CO 3	**Explain** the stability of ionic solids and **predict** the ionic character of covalent bond.
CO 4	**Correlate** the bond properties of homonuclear and heteronuclear diatomic molecules.
CO 5	**Explain** the aromaticity and mechanism of the organic reactions.
2. CHEMISTRY: CHC 101 (Inorganic and Organic Chemistry) [LAB: 2 credits]	
At the end of the course students will be able to:	
CO 1	**Prepare** Normal and Molar solutions.
CO 2	**Calculate** the amount of substance in solutions.
CO 3	**Determine** the physical constants of organic compounds.
CO 4	**Perform** qualitative and quantitative estimations.
3. COMPUTER SCIENCE: CSC 101 (Programming fundamentals using C) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Solve** and refine problems using computer.
CO 2	**Apply** algorithm and flow chart concept to solve the problem.
CO 3	**Use** various C programming language construct to implement programs.
CO 4	**Apply** pointers and structures in programming.
CO 5	**Implement** file handling concept in programming.

4. COMPUTER SCIENCE: CSG 102 (Cyber Space and Cyber Security) [Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Describe** various types of network standards and communication channels.
CO 2	**Perform** various e-commerce, m-commerce and e-banking transactions.
CO 3	**Familiarize** emerging threats in cyber space.
CO 4	**Apply** safety measures for online shopping and online payments.
CO 5	**Explain** the procedure for Cyber Forensics, Forensic investigation, and Data recovery, cloning of devices.

5. ELECTRONICS: ELC 101 (Network Analysis and Analog Electronics) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Analyze** the given circuit using relevant laws and theorems and 2-port network parameters.
CO 2	**Design** and **Construct** diode and transistor Amplifier circuits.
CO 3	**Explain** the working of oscillator circuits.
CO 4	**Explain** the construction & working of JFET and UJT.

6. MATHEMATICS: MTC 101 (Calculus and Numerical Methods)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Apply** properties and concepts of differential calculus to solve problems.
CO 2	**Construct** mathematical proofs of related theorems.
CO 3	**Apply** Numerical methods to solve related problems.
CO 4	**Use** Python software as an aid to solve problems.

7. PHYSICS: PYC 101 (Mathematical Methods & Mechanics and Electrical Circuit theory) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Apply** matrices, calculus, vectors and complex numbers to **Solve** mathematical problems.
CO 2	**Calculate** various parameters associated with motion of a moving body.
CO 3	**Convert** current source to voltage source and complex circuit with simple equivalent circuit.
CO 4	**Design** and **construct** Maxwell's, De-Sauty's and Wein's bridges.

8. GEOLOGY: GEC 101 (Fundamentals of Mineral Sciences) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Explain** the structure and composition of the Earth and the movements of lithospheric plates.
CO 2	**Identify** common rock forming minerals in hand specimens.
CO 3	**Classify** crystals based on symmetry elements.
9. GEOLOGY: GEG 101 (Minerals and Rocks) **[Theory and LAB: 3 + 1 = 4 credits]** At the end of the course students will be able to:	
CO 1	**Differentiate** between Minerals and Rocks.
CO 2	**Explain** the divisions of the interior of the Earth.
CO 3	**Outline** the theory of Plate Tectonics.
CO 4	**Assess** the Earth with a renewed perspective.
10. GEOLOGY: GEG 103 (Essentials of Geology) **[Theory and LAB: 3 + 1 = 4 credits]** At the end of the course students will be able to:	
CO 1	**Identify** major geomorphic features.
CO 2	**Interpret** physiographic data from toposheets.
11. GEOGRAPHY:GPGE-I (Resource Geography of Goa) [Theory: 4 credits] At the end of the course students will be able to:	
CO 1	**Explain** the Physical, Social, Economic and Cultural resources of Goa.
CO 2	**Explain** the distribution of various resources in the state of Goa.
CO 3	**Utilize** the resources judiciously.
12. HISTORY: HSG 101 (Goan Heritage) [Theory: 4 credits] At the end of the course students will be able to:	
CO 1	**Explain** the scope of Heritage and uses of oral history.
CO 2	**Explain** the impact of political development in Goa from earliest times to 1961.
CO 3	**Assess** the various aspects of historical, natural and environmental heritage of Goa.
CO 4	**Discuss** the socio-cultural heritage, folk traditions and heritage of Goa.

13. AECC: (English Communication) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Enhance** communication skills.
CO 2	**Express** through non-verbal communication.
CO 3	**Utilize** the technical writing skills.
CO 4	**Translate** the given text.
CO 5	**Trans-create** a given paragraph.
14. AECC: (Environmental Studies) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Identity** different types of natural resources.
CO 2	**Explain** the relation between man and environment.
CO 3	**Analyze** the impact of human activities on environment.
CO 4	**Identify** and **apply** various measures to be adopted for sustainable development.
CO 5	**Make** judicious use of the natural resources.
CO 6	**Play** an active role in the protection of the environment.
SEMESTER-II	
15. CHEMISTRY: CHC 102 (Physical and Organic Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Calculate** the thermodynamic parameters of thermochemical systems.
CO 2	**Determine** Gibbs free energy change for a chemical reaction.
CO 3	**Measure** the degree of hydrolysis, pH of different salts, solubility and solubility product of sparingly soluble salts.
CO 4	**Explain** the synthesis and reactions of hydrocarbons.
16. CHEMISTRY: CHC 102 (Physical and Organic Chemistry) [LAB: 2 credits]	
At the end of the course students will be able to:	
CO 1	**Calculate** the heat capacity and enthalpy of neutralisation using a calorimeter.
CO 2	**Determine** the effect of nature of reactants on rate of chemical reactions.
CO 3	**Measure** pH of different substances using a pH –meter.
CO 4	**Acquire** the skills on recrystallization and melting point determination.
CO 5	**Write** mechanism and do quantitative yield calculation.

17. COMPUTER SCIENCE: CSC 102 (Data Structures) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Implement** various data structures and its applications.
CO 2	**Apply** Recursive techniques in order to **evaluate** its performance.
CO 3	**Apply** Tree data Structure for different applications.
CO 4	**Implement** Searching and sorting techniques and **evaluate** its performance.
CO 5	**Explain** the various implementations in Hashing.
18. COMPUTER SCIENCE: CSG 110 (Client-Side Web Development) **[Theory and LAB: 3 + 1 = 4 credits]** At the end of the course students will be able to:	
CO 1	**Apply** HTML to **design** forms and validation.
CO 2	**Implement** styles and layout to **design** web pages using CSS.
CO 3	**Develop** responsive web pages using javascript.
CO 4	**Explain** the relevance of using frameworks in designing websites.
19. ELECTRONICS: ELC 102 (Linear and Digital Integrated Circuits) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Perform** base conversions and arithmetic operations in number systems.
CO 2	**Design** and **Construct** combination & sequential circuits, linear &nonlinear circuits using OP-AMPS, Multivibrator circuits using 555 timer and DAC/ADC circuits.
20. MATHEMATICS: MTC 102 (Matrices and Linear Algebra) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Use** geometric properties and strategies to solve problems in R^n .
CO 2	**Write** mathematical proof of related theorems.
CO 3	**Use** Python software as an aid to solve problems.

21. PHYSICS: PYC 102 (Heat & thermodynamics and Properties of Matter & Acoustics) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** the physical significance of entropy and internal energy.
CO 2	**Calculate** and **Derive** different parameters of heat and thermodynamics.
CO 3	**Calculate** elastic moduli, surface tension, and velocity of sound waves and rate of flow of liquids through a tube.
CO 4	**Obtain** unknown frequency of vibration using Helmholtz's resonator.
CO 5	C**alculate** reverberation time of a given auditorium hall using Sabine's formula.
22. GEOLOGY: GEC 102 (Introduction to Petrology) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Distinguish** and **classify** rocks based on their respective properties.
CO 2	**Categorize** and **identify** the rocks in hand specimen.
CO 3	**Compare** and contrast between various rock types.
CO 4	**Establish** relationship/lineage of different rock types in the field.
23. GEOLOGY: GEG 102 (Physical Geology) [Theory and LAB: 3 + 1 = 4 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** the action of wind, water and glaciers on the Earth.
CO 2	**Compare** the various geomorphological features of the Earth.
CO 3	**Evaluate** the landforms in field.
24. GEOLOGY: GEG 104 (Environmental Geology) [Theory and LAB: 3 + 1 = 4 credits]	
At the end of the course students will be able to:	
CO 1	Carry out EIA associated with mineral deposits.
25. GEOGRAPHY:GPGE-II Geography of Resource Utilization in Goa [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 2	**Explain** prospects of the state.
CO 3	**Explain** the limitations of resources utilization
CO 4	**Undertake** fieldwork to understand the resources of the state.

26. HISTORY: HSG 103 (History of Human Civilisation) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** the evolution of Village settlements and development of agriculture.
CO 2	**Explain** the contributions of the Mayan, Aztec , Inca , ancient China and Java.
CO 3	**Analyze** the age of Geographical exploration & scientific discoveries& its significance.
CO 4	**Describe** the important modern ideologies of this period.
CO 5	**Analyze** the major challenges of the Modern age.
27. AECC:(English Communication) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Enhance** communication skills.
CO 2	**Express** through non-verbal communication.
CO 3	**Utilize** the technical writing skills.
CO 4	**Translate** the given text.
CO 5	**Trans-create** a given paragraph.
28. AECC: (Environmental Studies) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Identity** different types of natural resources.
CO 2	**Explain** the relation between man and environment.
CO 3	**Analyze** the impact of human activities on environment.
CO 4	**Identify** and **apply** various measures to be adopted for sustainable development.
CO 5	**Make** judicious use of the natural resources.
CO 6	**Play** an active role in the protection of the environment.
SEMESTER-III	
29. CHEMISTRY: CHC 103 (Physical and Organic Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** the thermodynamic behaviour of solutions.
CO 2	**Apply** phase rule and Reduced phase rule diagrams of one and two component systems.
CO 3	**Calculate** the solubility and solubility product of sparingly soluble salts.

CO 4	**Determine** pH of solution using hydrogen and Quinhydrone electrode.
CO 5	**Interpret** the spectrum unknown organic molecule.
CO 6	**Write** the synthesis of selective organic compounds.
CO 7	**Design** synthesis of target organic molecules using diazotisation methodology.
30. CHEMISTRY: CHC 103 (Physical and Organic Chemistry) [LAB: 2 credits] At the end of the course students will be able to:	
CO 1	**Calculate** the Eutectic point for binary system.
CO 2	**Explain** the effect of solubility and impurity addition on Critical temperature.
CO 3	**Determine** the neutralization point, formal redox potential using Potentiometry and conductometry.
CO 4	**Carry out** functional group interconversions.
CO 5	**Perform** qualitative and quantitative organic analysis**.**
31. CHEMISTRY: CHS 106 (Pharmaceutical Chemistry and Intellectual Property Rights) [Theory: 3 credits] At the end of the course students will be able to:	
CO 1	**Apply** retro synthetic approach for designing drug synthesis.
CO 2	**Analyze** structure activity relationship for selected drugs.
CO 3	**Assess** the procedure of Indian Patent filing.
32. CHEMISTRY: CHS 106 (Pharmaceutical Chemistry and Intellectual Property Rights) [LAB: 1 credit] At the end of the course students will be able to:	
CO 1	**Analyze** and **estimate** purity of selected analgesic drugs.
CO 2	**Apply** synthetic knowledge in synthesis of drug like heterocyclic molecules.
CO 3	**Explain** the procedure for patent filing

33. COMPUTER SCIENCE: CSC 103 (Database Management System)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Model** the data using Entity Relation Diagram and relational schema.
CO 2	**Normalise** the given schema.
CO 3	**Apply** the Relational Algebra and SQL-constructs, in-order to solve the given queries.
CO 4	**Use** different concurrency control and Crash Recovery techniques

34. COMPUTER SCIENCE: CSS 103 (Programming in Python)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Explain** core Python scripting elements to Write python code.
CO 2	**Demonstrate** the use of the built-in data structures
CO 3	**Explain** Python's object-oriented features to write OOP code.
CO 4	**Write** robust code by handling errors and exceptions properly
CO 5	**Develop** applications using Python libraries

35. ELECTRONICS: ELC 103 (Communication Electronics)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Compare** different modulation schemes.
CO 2	**Explain** the architecture of Cellular Mobile Communication system.
CO 3	**Explain** the various blocks of a Mobile handset.
CO 4	**Describe** modern digital data, satellite communication and GPS navigation system.

36. ELECTRONICS: SEC 1(Programming in C++)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Develop** various applications using concept of Object Oriented Programming.

37. MATHEMATICS: MTC 103 (Ordinary Differential Equations and Discrete Mathematics) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course the students will be able to:

CO 1	**Formulate** and **solve** application problems described by ordinary differential equations.
CO 2	**Use** graph theory to model and solve real life related problems.

38.MATHEMATICS: MTS 101 (Statistical Methods) [Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Solve** problems related to probability theory.
CO 2	**Use** statistical methods to analyse and interpret data.
CO 3	**Test** the statistical hypothesis using parametric and non-parametric tests.
CO 4	**Use** R software to solve statistical problems.

39.PHYSICS: PYC 103 (Waves & Oscillations and Electronics) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Apply** concept of waves to simulate wave motion and wave interaction.
CO 2	**Comprehend** the physics of oscillations to design resonating systems.
CO 3	**Design** and **construct** rectifier circuits and voltage regulators using diodes.
CO 4	**Design** and **construct** oscillators using transistors, summing and difference amplifiers using Op-Amp.
CO 5	**Apply** various techniques to improve thermal stability of CE amplifiers.

40. GEOLOGY: GEC 103 (Earth's Dynamics and Structural Geology) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Explain** the internal structure of the Earth and its gravity and magnetic field.
CO 2	**Recognise** the various structures exhibited by rocks.
CO 3	**Relate** the rock structures to the forces involved in their formation.
CO 4	**Infer** the nature of the rocks from geological maps.
CO 5	**Measure** the attitude of the beds and Create topographic maps.

41. GEOLOGY: GES 101 (Basics of Remote Sensing)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Explain** the basic principles of remote sensing.
CO 2	**Categorise** satellites launched by various countries.
CO 3	**Explain** utility of different orbits for various types of satellites.
CO 4	**Interpret** geological information from satellite imagery.
CO 5	**Explain** the basic principles of remote sensing.

SEMESTER-IV

42. CHEMISTRY: CHC 104 (Physical and Inorganic Chemistry)

[Theory : 4 credits]

At the end of the course students will be able to:

CO 1	**Correlate** the properties of transition and inner transition elements.
CO 2	**Explain** the different crystal systems, reaction rates and structure and bonding.
CO 3	**Calculate** properties of the liquid state and Chemical Kinetics
CO 4	**Write** IUPAC nomenclature and **explain** the stereoisomerism in complexes.
CO 5	**Calculate** the activation energy and crystal field stabilisation energy.

43. CHEMISTRY: CHC 104 (Physical and Inorganic Chemistry) [LAB: 2 credits]

At the end of the course students will be able to:

CO 1	**Measure** the surface tension and viscosity of unknown liquids
CO 2	**Determine** various kinetics parameters.
CO 3	**Acquire** skills in gravimetry and volumetry.
CO 4	**Perform** qualitative and quantitative inorganic analysis.

44. CHEMISTRY: CHS 102 (Chemistry of Cosmetics and Perfumes)

[Theory: 3 Credits]

At the end of the course students will be able to:

CO 1	**Explain** schedules related to cosmetics in the drugs and cosmetics Act 1940
CO 2	**Classify and prepare** cosmetic formulations, perfumes and flavours.
CO 3	**Analyze** the role of cosmetic ingredients in various cosmetic preparations.

45. CHEMISTRY: CHS 102 (Chemistry of Cosmetics and Perfumes)

[LAB: 1 Credits]

At the end of the course the students will be able to:

CO 1	**Analyze** the role of ingredients used for the formulation of cosmetics.
CO 2	**Prepare** various types of cosmetics and herbal formulations.
CO 3	**Extract** oil from natural source.

46. COMPUTER SCIENCE: CSC 104 (Computer Organization and Operating Systems) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Apply** the methods of conversions from one number system to another.
CO 2	**Write** 8086 programs using an emulator.
CO 3	**Compare** different types of Input Output techniques
CO 4	**Apply** the different pre-emptive and non-pre-emptive scheduling algorithms in process management.
CO 5	**Analyze** Paging and Segmentation in Memory Management.

47. COMPUTER SCIENCE: CSS 104 (Web Application Development using Flask) [Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Develop** static web pages using HTML
CO 2	**Apply** Document and Website Structure to build forms.
CO 3	**Use** CSS rules to control the styling and layout of web pages
CO 4	**Develop** applications using Flask framework.
CO 5	**Implement** databases by using SQLAlchemy.

48. ELECTRONICS: ELC 104 (Microprocessor and Microcontrollers)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Develop** basic 8085 microprocessor based system.
CO 2	**Develop** 8051 microcontroller based Embedded system.

49. ELECTRONICS: SEC 2 (Smart Phone Apps Development) **[Theory and LAB: 3 + 1 = 4 credits]**	
CO 1	**Explain** the architecture and working of Android, IOS and Windows phone OS.
CO 2	**Design** android Apps for Smart Phones.
50. MATHEMATICS: MTC 104 **(Analysis and Operations Research)** **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Write** proof of related theorems.
CO 2	**Formulate** and **solve** Linear Programming Problems.
CO 3	**Apply** mathematical concepts to perform numerical and symbolic computations
51. MATHEMATICS: MTS 102 (Analytical Geometry) **[Theory and LAB: 3 + 1 = 4 credits]**	
CO 1	**Write** proof of theorems and solve related problems.
CO 2	**Trace** the general second degree conics/ conicoids using software Geogebra.
52. PHYSICS: PYC 104 (Optics and Modern Physics) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Explain** properties of electromagnetic radiation and X-rays.
CO 2	**Calculate** energy and frequency of accelerators and Miller's indices.
CO 3	**Apply** the knowledge of interference of waves in various interferometry techniques.
CO 4	**Obtain** form of polarised light using polaroid and optically active materials.
53. GEOLOGY: GEC 104 (Principles of Stratigraphy & Palaeontology) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Apply** the stratigraphic principles during field investigations.
CO 2	**Classify** common fossils.

54. GEOLOGY: GES 102 (Water Quality Assessment) **[Theory and LAB: 3 + 1 = 4 credits]**	
At the end of the course students will be able to:	
CO 1	**Identify** point and non-point sources of pollution.
CO 2	**Carry** out water sampling and test important water quality parameters in field and in laboratory.
CO 3	**Represent** water quality data graphically.
CO 4	**Carry** out risk assessment in relation to water quality and suggest remedial measure.
SEMESTER-V	
BSC- CHEMISTRY (HONOURS)	
55. CHEMISTRY: CHC 105 (Physical Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** application of quantum mechanics.
CO 2	**Apply** valence bond and molecular orbital theory for molecules.
CO 3	**Explain** Nuclear properties, nuclear forces and Radioactivity.
CO 4	**Use** molecular spectroscopy for structural elucidation of molecule.
CO 5	**Correlate** Electrochemical concepts in Electroplating and Energy Sources.
56. CHEMISTRY: CHC 105 (Physical Chemistry) [LAB: 2 credits]	
At the end of the course students will be able to:	
CO 1	**Calculate** energy of activation using chemical kinetics**.**
CO 2	**Interpret** the Raman and IR Spectra.
CO 3	**Measure** the dissociation constant of acids using pH-metry.
CO 4	**Verify** Freundlich adsorption isotherm.
CO 5	**Determine** the solubility product, degree of hydrolysis and hydrolysis constant of acids and salts using conductometry.
CO 6	**Measure** standard reduction potential and percentage composition and amount of halide in mixture using Potentiometry.

57. CHEMISTRY: CHC 106 (Inorganic Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Calculate** the effective nuclear charge and electronegativity of the elements.
CO 2	**Explain** the properties, structure and bonding of halogen, xenon compounds, and functions of biomolecules.
CO 3	**Analyze** the band gaps in solids and molecular orbital diagram of complexes.
CO 4	**Classify** the solids, carbon nanomaterials and interpret redox properties.
58. CHEMISTRY: CHC 106 (Inorganic Chemistry) [LAB: 2 credits]	
At the end of the course students will be able to:	
CO 1	**Analyze** unknown substance gravimetrically.
CO 2	**Calculate** the amount of unknown substance in solution.
CO 3	**Synthesize** ceramic pigment and coordination compounds.
59. CHEMISTRY: CHC 107 (Organic Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Predict the** aromaticity of organic compounds.
CO 2	**Explain** concepts of reaction mechanism w.r.t. aromatic substitution reactions.
CO 3	**Explain** various classes of selected heterocyclic compounds.
CO 4	**Apply** the methods of structural elucidation in deriving the structure of selected natural products.
CO 5	**Predict** the structural features of an unknown organic molecule using Infra Red spectroscopy.
CO 6	**Design** synthesis of dye.
60. CHEMISTRY: CHC 107 (Organic Chemistry) [LAB: 2 credits]	
At the end of the course students will be able to:	
CO 1	**Carry out** synthesis of target organic molecule in two steps.
CO 2	**Perform** functional group transformations.
CO 3	**Estimate** unknown compounds.
CO 4	**Predict** the structure of an unknown organic molecule using spectroscopy.

61. CHEMISTRY: CHD 104 (Essentials in Pharmaceutical Chemistry)

[Theory: 3 credits]

At the end of the course students will be able to:

CO 1	**Explain** the terminologies in pharmaceutical chemistry.
CO 2	**Discuss** the nomenclature of drug, structure activity relationship and physicochemical properties of drugs.
CO 3	**Apply** the concept of drug designing in synthesis.
CO 4	**Classify** various drugs.

62. CHEMISTRY: CHD 104 (Essentials in Pharmaceutical Chemistry)

[LAB: 1 credits]

At the end of the course students will be able to:

CO 1	**Explain** the standard operating procedures as given in Indian Pharmacopoeia.
CO 2	**Analyze** the percentage purity of drugs titrimetrically.
CO 3	**Synthesize** important drug molecules.
CO 4	**Identify** the polarity of branded drugs using chromatographic techniques.

63. CHEMISTRY: CHD 102 (Green Methods and Safety Aspects in Chemistry)

[Theory: 4 credits]

At the end of the course students will be able to:

CO 1	**Explain** the principles and need of green chemistry.
CO 2	**Carry out** awareness of green chemistry institutes and organizations.
CO 3	**Explain** the role of solid supported reagents in green synthesis.
CO 4	**Apply** concept of phase transfer catalysis as green alternative.
CO 5	**Use** green technologies in designing molecules.

BSC- COMPUTER SCIENCE (HONOURS)

64. COMPUTER SCIENCE: CSC 105 (Computer Networks)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Explain** the different network models and networks based on type and topology.
CO 2	**Explain** the use of transmission media based on their characteristics and applications.

CO 3	**Apply** various techniques to detect and correct errors.
CO 4	**Implement** different protocols for data transmission at the DLL.
CO 5	**Implement** networks setup and subnetting.
CO 6	**Implement** different transport and application layer protocols.

65. COMPUTER SCIENCE: CSC 106 (Object Oriented Programming)
[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Apply** the concepts of object-oriented technology for object-oriented software construction issues
CO 2	**Implement** object-oriented style of computation.
CO 3	**Apply** the inheritance concepts to handle dynamic binding and reuse of code.
CO 4	**Explain** the benefits of exception handling to handle errors.
CO 5	**Implement** design patterns in java.

66. COMPUTER SCIENCE: CSC 107 (Software Engineering)
[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Explain** evolution and fundamentals of software engineering methods.
CO 2	**Apply** Source Control using Git.
CO 3	**Apply** Agile software development principles using Scrum and Extreme Programming.
CO 4	**Perform** software testing using automated testing tools.
CO 5	**Apply** Refactoring techniques.

67. COMPUTER SCIENCE: CSD 102 (Data Mining)
[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Analyze** a variety of real-world applications that require mining.
CO 2	**Design** a data warehouse schema.
CO 3	**Prepare** data needed for data mining using data pre-processing techniques.
CO 4	**Apply** classification and prediction methods to solve real-world classification problems.
CO 5	**Apply** clustering methods and association analysis for solving real world data mining problems.

68. COMPUTER SCIENCE: CSD 104 (Embedded Systems)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Explain** the basic concepts of microprocessor, microcontroller and embedded systems.
CO 2	**Apply** the basics of interrupts for embedded systems.
CO 3	**Apply** the different architectures for building various embedded applications.
CO 4	**Apply** RTOS services for building various embedded applications.
CO 5	**Apply** various embedded software developments tools for building embedded applications.

69. COMPUTER SCIENCE: CSP 101-Project [4 credits]

At the end of the course students will be able to

CO 1	**Design** solutions to computational problems.
CO2	**Implement** software systems that meet specified design and performance requirements.

BSC- ELECTRONICS (HONOURS)

70. ELECTRONICS: ELC 105 (Operating System)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Explain** the fundamental concepts, problems and approaches in design of OS, RTOS and Embedded systems.
CO 2	**Develop** executable shell scripts and socket programs.

71. ELECTRONICS: ELC 115 (Power Electronics)

[Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Recognize** the role of power electronics for efficient energy applications.
CO 2	**Explain** performance of various power semiconductor devices and AC/DC Motors
CO 3	**Construct** and **Compare** power converter circuits.

72. ELECTRONICS: ELC 125 (Transducers and Instrumentation) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Analyze** the Performance characteristics and **Compare** the various types of standards used in measurements.
CO 2	**Develop** a transducer based signal conditioning system.
CO 3	**Explain** the working principle of instruments used in electrical and electronics laboratory.
73. ELECTRONICS: ELD 105(Photonics) [Theory and LAB: 3 + 1 = 4 credits]	
At the end of the course students will be able to:	
CO 1	**Acquire** the basic knowledge of Wave Optics.
CO 2	**Apply** the knowledge of optoelectronic devices to **design** various circuits.
74. ELECTRONICS: ELD 115 (Programming with MATLAB) [Theory and LAB: 3 + 1 = 4 credits]	
At the end of the course students will be able to:	
CO 1	**Write** programs in MATLAB, **plot** and **format** 2D graphs.
BSC- MATHEMATICS (HONOURS)	
75. MATHEMATICS: MTC 105 (Algebra) [Theory: 6 credits]	
At the end of the course students will be able to:	
CO 1	**Apply** the concepts of Group and Ring to solve related problems.
CO 2	**Write** proof of the related theorems.
76. MATHEMATICS: MTC 106 (Analysis II) [Theory: 6 credits]	
At the end of the course the students will be able to:	
CO 1	**Evaluate** improper integrals.
CO 2	**Compute** beta, gamma functions and **write** Fourier series representation of the function.
CO 3	**Write** proof of related theorems.

77. MATHEMATICS: MTC 107 (Calculus of 2 and 3 variables) [Theory: 6 credits]	
At the end of the course students will be able to:	
CO 1	**Find** extreme values of functions of several variables.
CO 2	**Apply** the concepts to solve related real life problems.
CO 3	**Write** proof of the related theorems.
78. MATHEMATICS: MTE 101 (Foundations of Mathematics) [Theory: 6 credits]	
At the end of the course students will be able to:	
CO 1	**Present** mathematics logically.
CO 2	**Write** proof of related theorems.
79. MATHEMATICS: MTE 102 (Combinatorics) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO1	**Apply** various counting techniques to solve related problems.
CO2	**Write** proof of related theorems.
BSC- GEOLOGY (HONOURS)	
80. GEOLOGY: GEC 105 (Mineralogy) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO1	**Explain** the working of a petrological microscope.
CO2	**Identify** the minerals based on optical properties.
CO3	**Differentiate** between different silicate group minerals.
CO4	**Compare** the working of various binary systems and their applications to magmatic textures and processes.
81. GEOLOGY: GEC 106 (Structural Geology) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Identify** geological structures in field and collect structural data.
CO 2	**Generate** strain ellipsoid and infer past stress fields.
CO 3	**Solve** structural problems.
CO 4	**Construct** geological cross section using geological map.

82. GEOLOGY: GEC 107 (Igneous Petrology) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Identify** common igneous rocks both in hand specimen and thin section.
CO 2	**Classify** and **describe** igneous structures and textures, and infer the geological processes involved in their formation.
CO 3	**Classify** and **describe** igneous structures.
CO 4	**Interpret** phase diagrams of common igneous systems.
83. GEOLOGY: GED 101 (Engineering Geology) **[Theory and LAB: 3 + 1 = 4 credits]** At the end of the course students will be able to:	
CO 1	**Select** the appropriate sites for engineering projects.
CO 2	**Suggest** remedial measures for the improvement of sites.
84. GEOLOGY: GED 102 (Economic Geology) **[Theory and LAB: 3 + 1 = 4 credits]** At the end of the course students will be able to:	
CO 1	**Classify** various economic ore minerals into their respective categories.
CO 2	**Compare** between ore minerals found locally to those found on regional scale.
CO 3	**Evaluate** different processes of ore enrichment.
CO 4	**Calculate** ore reserves.
85. GEOLOGY: GED 104 (Project) [4 credits] At the end of the course students will be able to:	
CO 1	**Undertake** research work independently or in collaboration.
CO 2	**Use** scientific reasoning to gather, evaluate and interpret evidence.
CO 3	**Develop** their critical thinking and analytical skills.
CO 4	**Use** the various statistical methods for plotting and analysis of scientific data,
CO 5	**Analyze** global problems from perspectives to propose solutions.
CO 6	**Write** scientific reports.

86. GEOLOGY: GED 106 (Remote Sensing and Photogeology)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Explain** the basic principles of remote sensing.
CO 2	**Categorise** satellites launched by various countries.
CO 3	**Explain** utility of different orbits for various types of satellites.
CO 4	**Interpret** data from aerial photographs.
CO 5	**Solve** photogrammetric problems.
CO 6	**Interpret** geological information from aerial photographs.

87. GEOLOGY: GED 107 (Coal and Petroleum Geology)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Explain** the occurrence and distribution of coal and petroleum deposits.
CO 2	**Plot** structural data related to coal and petroleum.

88. GEOLOGY: GES 103 (Field Geology)

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Identify** and **collect** information about field characters of rocks.
CO 2	**Prepare** geological maps.

89. GEOLOGY: GES 104 Environmental Impact Assessment

[Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Collect** baseline information about environmental quality parameters.
CO 2	**Analyze** environmental data.

SEMESTER-VI

BSC- CHEMISTRY (HONOURS)

90. CHEMISTRY: CHC 108 (Physical Chemistry) [Theory: 4 credits]

At the end of the course students will be able to:

CO 1	**Apply** the principles of quantum mechanics to Schrodinger's wave equation,

	variation theorem and chemical bonding.
CO 2	**Use** spectroscopic principles in analysis of Mass, NMR and ESR spectrum.
CO 3	**Apply** the concept of Nuclear properties and nuclear forces, stability to explain the Nuclear fission and its applications.
CO 4	**Explain** the applications of radioisotopes and biological effects of radiation.
CO 5	**Determine** pH, pOH, pKb, pKa and Henderson equations.
91. CHEMISTRY: CHC 108 (Physical Chemistry) [LAB: 2 credits] At the end of the course students will be able to:	
CO 1	**Carry out** conductometric titrations for acids, bases, salts and Mixtures.
CO 2	**Analyze** IR and Raman Spectra.
CO 3	**Measure** Energy of activation using chemical Kinetics.
CO 4	**Determine** strength of the acids and dissociations using Potentiometry , conductomentry and pH metry .
CO 5	**Verify** adsorption isotherms Using weak acids.
92. CHEMISTRY: CHC 109 (Inorganic Chemistry) [Theory: 4 credits] At the end of the course students will be able to:	
CO 1	**Compute** the magnetic moment of complexes.
CO 2	**Determine** the ground state terms and outline the types of electronic transitions.
CO 3	**Explain** the mechanism of substitution reactions in octahedral complexes.
CO 4	**Apply** the trans effect to justify the formation of selective geometrical isomer.
CO 5	**Explain** the different types of reactions in non-aqueous solvents.
CO 6	**Discuss** the symmetry elements and determine point groups for covalent molecules.
CO 7	**Classify** the organometallic compounds and explain their stability.
93. CHEMISTRY: CHC 109 (Inorganic Chemistry) [LAB: 2 credits] At the end of the course students will be able to:	
CO 1	**Prepare** normal and molar solutions of a substance.
CO 2	**Calculate** the amount of substance in given solutions.
CO 3	**Carry out** volumetric titrations for estimation of unknown substance.
CO 4	**Analyze** the results.

94. CHEMISTRY: CHC 110 (Organic Chemistry) [Theory: 4 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** mechanisms of important named reactions and rearrangements.
CO 2	**Synthesize** alkylated carbonyl compounds and terpenes.
CO 3	**Analyze** the acidity of carbonyl compounds and predict its reactivity.
CO 4	**Analyze** the types of photochemical reaction for its product formation.
CO 5	**Predict** ring size of fructose and glucose in sucrose.
CO 6	**Explain** stereochemistry and mechanism of addition, elimination and substitution reactions.
95. CHEMISTRY: CHC 110 (Organic Chemistry) [LAB: 2 credits]	
At the end of the course students will be able to:	
CO 1	**Analyze** the functional groups and their reactivity.
CO 2	**Prepare** derivatives of important functional groups.
CO 3	**Analyze** organic mixtures for its chemical type.
CO 4	**Separate** organic mixtures of different chemical types.
CO 5	**Identify** unknown compound.
96. CHEMISTRY: CHP 101 (Project) [4 credits]	
At the end of the course students will be able to:	
CO 1	**Plan**, **design** and **carry out** scientific experiments.
CO 2	**Explore** new areas of research in both chemistry and allied fields of science and technology.
CO 3	**Operate** modern equipments.
CO 4	**Effectively** communicate the results of scientific work in oral, written and electronic formats.
BSC- COMPUTER SCIENCE (HONOURS)	
97. COMPUTER SCIENCE: CSC 108 (Mobile Application Development) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** the anatomy of a mobile app.
CO 2	**Use** Android components in designing simple mobile applications.

CO 3	**Perform** basic CRUD operations on persistent data.
CO 4	**Design** complete Android app by integrating the android building blocks and using firebase as backend tool.
98. COMPUTER SCIENCE: CSC 109 (Full Stack Web Development) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Explain** the significance of each of the MERN components.
CO 2	**Develop** a CRUD application using MongoDb.
CO 3	**Develop** applications using NODE.js
CO 4	**Design** and implement a full-fledged application using all the components of the MERN Stack.
99. COMPUTER SCIENCE: CSC 110 (Internet of Things) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Explain** the requirements and components of an IOT system.
CO 2	**Develop** IOT Projects using cloud platform.
100. COMPUTER SCIENCE: CSD 105 (Network Security) **[Theory and LAB: 3 + 1 = 4 credits]** At the end of the course students will be able to:	
CO 1	**Explain** the need and concepts of security.
CO 2	**Apply** encryption techniques for secure data transmission.
BSC- ELECTRONICS (HONOURS)	
101. ELECTRONICS: ELC 106 (Computer Networks and Administration) **[Theory and LAB: 4 + 2 = 6 credits]** At the end of the course students will be able to:	
CO 1	**Assemble** and **Troubleshoot** a PC.
CO 2	**Differentiate** between OSI-ISO and TCP/IP layers.
CO 3	**Compare** different switching techniques**.**
CO 4	**Install, Configure** and **Manage** wired and wireless networks.

102. ELECTRONICS: ELC 116 (Biomedical and Pharmaceutical Instrumentation) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Explain** the anatomy and physiology of human body.
CO 2	**Explain** the working of various pharmaceutical and biomedical instruments.
CO 3	**Discuss** the use of biotelemetry in patient care.

103. ELECTRONICS: ELC 126 (Embedded Systems) [Theory and LAB: 4 + 2 = 6 credits]

At the end of the course students will be able to:

CO 1	**Develop** Programs for TI MSP430 microcontroller
CO 2	**Explain** low-power technology and Interrupt mechanisms.
CO 3	**Demonstrate** Real time interfacing for peripheral devices.
CO 4	**Design** embedded system.

104. ELECTRONICS: ELD 106 (Industrial Automation) [Theory and LAB: 3 + 1 = 4 credits]

At the end of the course students will be able to:

CO 1	**Design** PLC based applications.
CO 2	**Explain** the architecture of Distributed Control Systems.
CO 3	**Develop** applications based on SCADA.

105. ELECTRONICS: ELP 106 (Project) [4 credits]

At the end of the course students will be able to:

CO 1	**Develop** an ability to to identify the problems of society**.**
CO 2	**Analyze** the collected data.
CO 3	**Provide** suitable solution by designing and developing hardware-software codesign electronic system.

BSC- MATHEMATICS (HONOURS)	
106. MATHEMATICS: MTC 108 (Differential Equations-II) **[Theory: 6 credits]** At the end of the course students will be able to:	
CO 1	**Solve** differential equations using different methods.
CO 2	**Write** proof of related theorems.
107. MATHEMATICS: MTC 109 (Complex Analysis) **[Theory: 6 credits]** At the end of the course students will be able to:	
CO 1	**Apply** basic concepts of complex analysis to solve related problems.
CO 2	**Write** proof of related theorems.
108. MATHEMATICS: MTC 110 (Metric Spaces) **[Theory: 6 credits]** At the end of the course students will be able to:	
CO 1	**Apply** basic concepts of metric spaces and solve related problems.
CO 2	**Write** proof of related theorems.
109. MATHEMATICS: MTE 103 (Number Theory) [Theory: 4 credits] At the end of the course students will be able to:	
CO 1	**Apply** concepts of number theory to solve related problems.
CO 2	**Write** proof of related theorems.
110. MATHEMATICS: MTE 104 (Operations Research II) [Theory: 4 credits] At the end of the course students will be able to:	
CO 1	**Apply** concepts to solve problems related to decision making.
CO 2	**Write** proof of related theorems.

111. MATHEMATICS: MTP 101(Project) [4 credits]	
At the end of the course students will be able to:	
CO1	**Effectively** communicate the results studied.
CO2	**Use** mathematical software.
BSC- GEOLOGY (HONOURS)	
112. GEOLOGY: GEC 108 (Sedimentary Petrology) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Categorise** unknown rocks into the class of sedimentary rocks.
CO 2	**Compare** the characteristics of sedimentary rocks from different regions.
CO 3	**Interpret** the environments of deposition from the study of nature of sediments & depositional structures.
CO 4	**Determine** the order of superposition of rocks.
CO 5	**Assess** the grain size and grain size parameters.
113. GEOLOGY: GEC 109 (Metamorphic Petrology) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Distinguish** metamorphic rocks from other types of rocks.
CO 2	**Categorize** and **relate** the metamorphic mineral assemblages according to their modes of formation.
CO 3	**Describe** the textures and structures exhibited by metamorphic rocks.
CO 4	**Interpret** tectonic settings based on the type of metamorphic rock.
114. GEOLOGY: GEC 110 (Indian Stratigraphy) [Theory and LAB: 4 + 2 = 6 credits]	
At the end of the course students will be able to:	
CO 1	**Explain** the mode of origin of different rock formations of India and correlate it with other formations.
CO 2	**Apply** the stratigraphic principles during field investigations.
CO 3	**Propose** further refinement if needed in the already established stratigraphy of India.

115. GEOLOGY: GED 103 (Mining Geology)
[Theory and LAB: 3 + 1= 4 credits]

At the end of the course students will be able to:

CO1	**Carry** out exploration and sampling for economic minerals.
CO2	**Estimate** reserves and prepare mine plans.

116. GEOLOGY: GED 104 [Project: 4 credits]

At the end of the course the students will be able to:

CO 1	**Undertake** research work independently or in collaboration.
CO 2	**Use** scientific reasoning to gather, evaluate and interpret evidence.
CO 3	**Develop** their critical thinking and analytical skills.
CO 4	**Use** the various statistical methods for plotting and analysis of scientific data,
CO 5	**Analyze** global problems from perspectives to propose solutions.
CO 6	**Write** scientific reports.

117. GEOLOGY: GED 105 (Geomorphology)
[Theory and LAB: 3 + 1= 4 credits]

At the end of the course students will be able to:

CO 1	**Identify** various landforms formed due to action of water, wind, glaciers and volcanoes.
CO 2	**Carry** out morphometric analysis.

118. GEOLOGY: GED 108 (Environmental Geology)
[Theory and LAB: 3 + 1= 4 credits]

At the end of the course students will be able to:

CO 1	**Carry** out EIA associated with mineral deposits.

119. GEOLOGY: GED 109 (Hydrogeology)
[Theory and LAB: 3 + 1= 4 credits]

At the end of the course students will be able to:

CO 1	**Prepare** flow nets.
CO 2	**Represent** graphically the water quality parameters.

120. GEOLOGY: GED 110 (Gemmology) **[Theory and LAB: 3 + 1= 4 credits]** At the end of the course students will be able to:	
CO 1	**Identify** various precious stones.
CO 2	**Acquire** skills to enhance the value of gems.
121. GEOLOGY: GES 105 (GIS Fundamentals) **[Theory and LAB: 3 + 1= 4 credits]** At the end of the course students will be able to:	
CO 1	**Georeference** and **prepare** thematic maps using various softwares.
CO 2	**Analyze** and **classify** the data.