UNIVERSITY COLLEGE OF SCIENCE, TUMKUR

2018-19

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PART – I

UNDER GRADUATION

1. PROGRAMME OUTCOMES

Programme outcomes of the Three Year Degree General Higher Education Programs identified by the College.

Students of all undergraduate general degree Programs at the time of graduation will be empowered towards:

PO1. **Critical Thinking**: Take informed actions after identifying the assumptions that frame their thinking and actions, checking out the degree to which these assumptionsare accurate and valid, and looking at their ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. **Effective Communication**: Speak, read, write and listen clearly in person andthrough electronic media in English and in one Indian language, and make sense of the world by connecting people, ideas, books, media and technology.

PO3. **Social Interaction**: Elicit views of others, mediate disagreements and help to reach conclusions in group settings.

PO4. **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. **Ethics**: Recognize different value systems including their own, understand the moral dimensions of their decisions and to accept their responsibility.

PO6. **Environment and Sustainability**: Understand and exhibit consciousness of the issues of environmental contexts and sustainable development.

PO7. **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and
life-long learning in the broadest context of socio-technological changes.

PO8**. Problem Solving**: Identify, formulate and analyze complex Socio-Political, socio-economic, socio-cultural problems reaching substantiated conclusions using
first principles of mathematics, natural sciences, management and entrepreneurial skills.

PO9**. Project management and finance**: Demonstrate knowledge and understanding of the finance and management principles and apply these to one's own work, as a member and
leader in a team, to manage projects and in multidisciplinary environments.

PO10**. Individual and team work**: Function effectively as an individual, and as a member or
leader in diverse teams, and in multidisciplinary settings.

PO11**. Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO12**. Design/Development of solutions**: Design solutions for complex socio-economic problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

2. PROGRAMME SPECIFIC OUTCOMES

1. Faculty of Science:

Program Specific Outcomes:

1. BSC-PCM

PSO1:Acquire knowledge of specific subjects such as Physics, Chemistry, and Mathematics

PSO2:Apply appropriate methods of research and investigation to solve problems in related subjects

PSO3:Understand basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in day-to-day life.

PSO4:Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments

PSO5:Develop team spirit and co- ordination in students through experiential and investigative laboratory learning.

PSO6:Develop ability to logically analyze data and solve problems systematically and objectively analyze open ended problems.

PSO7:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical knowledge

PSO8:Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.

PSO9:Demonstrate generic competencies such as communicating technical concepts in popular language, skilled use of ICT and ability to work both individually and in groups

PSO10:Analyze the applications of mathematics to the problems in physics & develop suitable mathematical method for such applications& formulation of physical theories

2. BSC- PME

PSO1:Acquire knowledge of specific subjects such as Physics, Mathematics and Electronics

PSO2:Employ highly developed conceptual and analytical skills.

PSO3:Analyze the applications of mathematics to the problems in physics & develop suitable mathematical method for such applications and formulation of physical theories.

PSO4:Analyze the given scientific data critically and systematically

PSO5:Understandthe analytical methods required to interpret and analyze results and draw conclusions as supported by their data.

PSO6:Take up competitive examinations as the knowledge of science is a definite advantage at the entrance examination of Indian Administrative Services and other state and central Govt. services.

PSO7:Recognize the importance of mathematical modelling simulation and computing, and the role of approximation and mathematical approaches to describing the physical world.

PSO8:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical knowledge

PSO9:Understand basic theoretical and applied principles of electronics needed to enter the job force.

PSO10:Communicate basic electronics concepts to non-electronics students.

3. BSC- PMCs

PSO1:Acquire knowledge of specific subjects such as Physics, Mathematics and computer science

PSO2:Think creatively to propose novel ideas in explaining facts and figures

PSO3:Able to understand, analyze and develop software programs in the areas related to system software, web design, application program

PSO4:Serve as the Programmers or the Software Engineers with the sound knowledge of practical and theoretical concepts for developing software.

PSO5:Demonstrate relevant generic skills and global competencies such as problem solving, investigative, communicative and ICT skills

PSO6:Develop the team spirit and co- ordination among students through experiential and investigative laboratory learning.

PSO7:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical knowledge

PSO8:Analyze the applications of mathematics to the problems in physics & develop suitable mathematical method for such applications and formulation of physical theories

PSO9:Improve their computer literacy, their basic understanding of operating systems and a working knowledge of software commonly used in academic and professional environments.

PSO10:Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.

4. BSC-CBZ

PSO1: Understand the nature and basic concepts of cell biology, genetics, taxonomy , physiology, biochemistry, ecology , evolutionary biology, developmental biology and applied economic zoology

PSO2. Analyse the relationships among animals, plants and microbes.

PSO3: Develop the team spirit and co- ordination in students through experiential and investigative laboratory learning.

PSO4:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical

PS05:Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.

PS06: Students will be able to function as a member of an interdisciplinary problem solving team.

PSO7:Understand the structural organization and variation in chromosomes

PSO8:Understand Plant Diversity and its importance in the maintenance of ecological balance

PSO9:Understand the diversity, morphology, classification, anatomy and the reproductive features of the flora.

PSO10:Develop knowledge related to cytology, metabolism, physiology and applied aspects of plant science.

5. BSC- CBBt

PSO1:Acquire knowledge of specific subjects such as Chemistry, Botany and Biotechnology

PSO2:Develop the team spirit and co- ordination among students through experiential and investigative laboratory learning.

PSO3:Develop the team spirit and co- ordination in students through experiential and investigative laboratory learning.

PSO4:Understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in day-to-day life.

PSO5:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical knowledge

PSO6:Understand the structural organization and variation in chromosomes

PSO7:Understand Plant Diversity and its importance in the maintenance of ecological balance

PSO8:Able to grasp basic knowledge on various domains of biotechnology

PSO9:Understand the diversity, morphology, classification, anatomy and the reproductive features of the flora.

PSO10:Develop knowledge related to cytology, metabolism, physiology and applied aspects of plant science.

6. BSC -CZBt

PSO1:Inculcate broad and balanced knowledge and understanding of key concepts in Chemistry, Zoology and biotechnology sciences

PSO2:Plan and carry out experiments independently and assess the significance of outcomes and cater to the demands of scientific field

PSO3:Develop the team spirit and co- ordination in students through experiential and investigative laboratory learning.

PSO4:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical knowledge

PSO5:Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in day-to-day life.

PSO6:Acquire a systematic understanding of the different areas of study in Chemistry, Zoology & Biotechnology

PSO7:Possess a broad understanding of how psychological aspects shape and affect human values

PSO8:Understand Plant Diversity and its importance in the maintenance of ecological balance

PSO9:Understand the diversity, morphology, classification, anatomy and the reproductive features of the flora.

PSO10:Develop knowledge related to cytology, metabolism, physiology and applied aspectsof plant science.

7. BSC-CZMb

PSO1:Inculcate broad and balanced knowledge and understanding of key concepts in Chemistry, Zoology and Microbilogical sciences

PSO02: Students will also study the growth and control of microbes as well as different bacteriological techniques involved in microbiology.

PSO3:Develop the team spirit and co- ordination in students through experiential and investigative laboratory learning.

PSO4:Develop skills necessary to plan, design and conduct experiments to test, demonstrate, verify and extend theoretical knowledge

PSO5:Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in day-to-day life.

PSO6:Acquire a systematic understanding of the different areas of study in Chemistry, Zoology & Biotechnology

PSO7:Possess a broad understanding of how psychological aspects shape and affect human values

PSO8:Understand Plant Diversity and its importance in the maintenance of ecological balance

PSO9:Understand the diversity, morphology, classification, anatomy and the reproductive features of the flora.

PSO10:Develop knowledge related to cytology, metabolism, physiology and applied aspects of plant science.

2. Faculty of BVOC: Hardware Technology & Networking

Program Specific Outcomes:

PSO1: Serve as the Programmers & the Hardware and Network Engineers with a sound knowledge of practical and theoretical concepts for developing software and Hardware.

PSO2: Serve as the Computer Engineers with enhanced knowledge of computers and its building blocks.

PSO3: Work as System Engineers, System Integrators and System Administrators with thorough knowledge of Hardware Designers/Engineers with the knowledge of Networking Concepts.

PSO4: Work as Support Engineers and Technical Writers, develop IT-oriented security issues and protocols.

PSO5: Solve problems (programming networking database and Server Management) in the Information Technology environment and function effectively in teams to accomplish a common goal and demonstrate professional behavior.

PSO6: Work as IT Sales and Marketing persons, work as Consultants and Management officers for system management.

PSO7: Serve as the IT Officers in Banks and cooperative societies DTP Operators in small-scale firms and business organizations.

PSO8: Serve as the Component Designers with latest IOT development technologies improve their computer literacy, their basic understanding of operative systems and a working knowledge of software/Hardware commonly used in academic and professional environments.

PSO9: Develop criteria to organize and present different type of works in academic and professional environments.

PSO10: Use of IOT devices & sensors to design a working model by using appropriate software/Hardware and Present ideas effectively and efficiently in Academic and Professional Presentation

Part – II

Course Outcomes- UG Courses

COMPULSORY PAPER FOR 1st YEAR DEGREE COURSE

Title of the Paper: BASCIF131 - Indian Constitution

Course Outcomes:

CO1: Be able to critically assess the actions in the political process and determine their motive.
CO2: Be familiar with a number of contemporary political issues and better understand their make-up and importance.
CO3: Exhibit understanding of the rules regulations by which they are governed.
CO4: Show familiarity with the knowledge of Rights and Duties passed in constitutional state.
CO5: Be able to better comprehend other's views and formulate defense.

COMPULSORY PAPER FOR 1ST YEAR DEGREE COURSE

Title of the Paper: BASHRF181 - Human Rights and Gender Equity

Course Outcomes:

CO1: Understand the historical growth of the idea of human rights.
CO2: Demonstrate an awareness of the international context of human rights.
CO3: Exhibit the consciousness of position of human rights in India.
CO4: Understand the importance of the Human Rights Act.
CO5: Analyze and evaluate concepts and ideas.

Language Papers: KANNADA

Title of the Paper: PÀ£À¼qÀ PÁªÀå, ¥À§AzÀ ºÁUÀs ¸ÀA¸À¤À£À PÀ£À¼qÀUÀ¼À CzÀåAiÀÄ£À–PÀ£À¼qÀ ¨ÁµÁ ¥ÀwPÉ–1

¥À®±ÀÄw:

CO1 : PÀ£À¼qÀ ¨ÁµÉAiÀÄ£ÀÄ¼ ±ÀÄzÀ¥ªÁV NzÀÄªÀ, §gÉAiÀÄÄªÀ PË±À®ªÀ£ÀÄ¼ UÀ½APÉsArgÀÄªÀ¼zÀÄ

CO2 : ¸Á»vÀåzÀ ««zÀ ¥ÀPÁgÀUÀ¼À CjªÀ¼ ªÀÄsrAPÉsArgÀÄªÀ¼zÀÄ

CO3: PÀ£À¼qÀ ¸Á»vÀåzÀ ««zÀ ¥ÀPÁgÀUÀ¼ÁzÀ PÀxÉ, PÀªÀ£À, ¥À²Á¸À PÀxÀ£À, «eÁ¼£À vÉÃR£À, ªÀåQÛavÀ, ¥À§AzÀ, «£ÉsÃzÀ §gÉºÀ, ªÉszÀvÁzÀ ¥ÀPÁgÀUÀ¼À£ÀÄ¼ ¸ÀA²ÁzÀ, ¥À§AzÀ ªÀÄAqÀ£É, «±É¢ÃµÀuÉ, ZÀZÉð, UÀÄA¥ÀÄ ZÀZÉð ªÉszÀvÁzÀÄªÀ¼UÀ¼À ªÀÄs®PÀ CxÉÊðAPÉs¼ÀÄî²ªÀ¼zÀÄ. F ªÀÄs®PÀ ¨ÁµÉ, ¸Á»vÀå ºÁUÀs ¸ÀA¸À¤À£À PË±À®UÀ¼À£ÀÄ¼ ªÀÈ¢ÞAPÉsArgÀÄªÀ¼zÀÄ.

CO4: ¸Á»vÀå N¢£À eÁ¼£À¤À£À£ÀÄ¼ ¸ÀåzÁðvÀªPÀ ¥ÀjÃPÉ¢UÀ½UÉ C¼À¤ÀrAPÉs¼ÀÄî²ªÀ ¸ÁªÀÄxÀåð ¨É¼ÉAPÉsArgÀÄªÀ¼zÀÄ

Title of the Paper: PÀ£À¼qÀ PÁªÀå, PÀvÉ, vÉÃR£À ºÁUÀs ¸ÀA¸À¤À£À PÀ£À¼qÀUÀ¼À CzÀåAiÀÄ£À –PÀ£À¼qÀ ¨ÁµÁ ¥ÀwPÉ–2

¥À®±ÀÄw:

CO1: PÀ£À¼qÀ ¨ÁµÉAiÀÄ£ÀÄ¼ ZÉ£ÁV NzÀÄªÀ, §gÉAiÀÄÄªÀ eÁ¼£À¤À£À¼ ºÉsAÇgÀÄªÀ¼zÀÄ

CO2: £ÀqÀÄUÀ£À¼qÀ ¸Á»vÀåzÀ ««zÀ ¥ÀPÁgÀUÀ¼À CjªÀ¼ ªÀÄsrAPÉsArgÀÄªÀ¼zÀÄ

CO3: ºÉs¸ÀUÀ£À¼qÀ ¥ÀPÁgÀUÀ¼ÁzÀ PÀvÉ, PÀªÀ£À, PÀxÀ£À PÀªÀ£À, CAPÀt §gÉºÀ, ¥ÀjµÀgÀ vÉÃR£À, ¥ÀjZÀAiÀÄ vÉÃR£À, ¸ÀA¸À¤À£À PÀ£À¼qÀzÀ vÉÃR£ÀUÀ¼À NzÀÄ, «±É¢ÃµÀuÁ PË±À® ¨É¼ÉAPÉsArgÀÄªÀ¼zÀÄ

CO4: ¸Á»vÀåzÀ ªÀÄs®PÀ fÃªÀ£À ªÀiË®åUÀ¼À£ÀÄ¼ §zÀÄQ£À9¢ C¼À¤ÀrµÀPÉsArgÀÄªÀ¼zÀÄ

CO5: ¸Á»vÀåzÀ ªÀiË®åUÀ¼À£ÀÄ¼ ¸ÀªÀÄPÁ9Ã£À §zÀÄQUÉ C£À¢¬ÄAPÉsArgÀÄªÀ¼zÀÄ

Language Papers: ENGLISH

Title of the Paper: English Prose and Essays – Paper I

Course Outcomes:

CO1: Be aware of the English writers through stories.
CO2: Show an awareness of the English writers through essays
CO3: Exhibit skills in basic English grammar
CO4: Demonstrate skills in translation/Translate sentence

Title of the Paper: English Prose and Essays – Paper II

Course Outcomes:

CO1: Be aware of the English writers through stories.
CO2: Show an awareness of the English writers through essays
CO3: Exhibit skills in basic English grammar
CO4: Demonstrate skills in translation/Translate sentence

Title of the Paper: English Prose and Essays – Paper III

Course Outcomes:

CO1: Be aware of ancient and modern poets
CO2: Show an awareness of famous writers writing dramas
CO3: Exhibit skills in Basic English grammar
CO4: Demonstrate skills in English terminology

Title of the Paper: English Prose and Essays – Paper IV

Course Outcomes:

CO1: Be aware of ancient and modern poets
CO2: Show an awareness of famous writers writing dramas
CO3: Exhibit skills in Basic English grammar
CO4: Demonstrate skills in English terminology

Faculty of Sanskrit

Title of the Paper: Sanskrit ProseCourse

Outcomes:

CO1: Develop familiarity to study Sanskrit prose literature.
CO2: Gain knowledge about Indian writer's competency.
CO3: Understand the cases, conjugation and other grammar aspects.
CO4: Demonstrate the ability to translate Sanskrit prose in to Kannada/English.

Title of the Paper: Sanskrit Poetry.Course

Outcomes:

CO1: An increased ability to read and understand Sanskrit poetry texts.
CO2: An increased knowledge and understanding of Sanskrit grammar.
CO3: Gain basics of Sanskrit literature.
CO4: Acquaintance Sanskrit culture and religious background.
CO5: A basic idea about Sanskrit semantics.

Title of the Paper: Sanskrit Dramatics

Course Outcomes:

CO1: Understand the history of Sanskrit Dramatics.
CO2: Familiarize with major Sanskrit dramas and its structure.
CO3: Enact dramas in classrooms.
CO4: Understand the Alankaras depicted in Drama and poetry.
CO5: Appreciate Indian stories.

Faculty of Hindi

Title of the Paper I: Prose and Essays I

Course Outcomes:

CO1: An increased ability to read and understand Hindi texts.
CO2: Show awareness about Hindi writers through stories and essays.
CO3: Understand basic Hindi grammar.
CO4: Ability to translate sentences into other languages.

Title of the Paper II: Hindi Prose and Essays

Course Outcomes:

CO1: Learn about famous Hindi writers through their writings.
CO2: Exhibit an increased knowledge of famous Hindi writers through essays.
CO3: Develop basic grammar skills like Gender, Number, and Noun etc.
CO4: Ability to translate complex Hindi sentences.

Title of the Paper III: Hindi Poetry and Drama

Course Outcomes:

CO1: Get aware of ancient and modern poets.
CO2: Acquire knowledge of famous Hindi dramatists.
CO3: Exhibit improved skills in basic Hindi grammar.
CO4: Indicate broader understanding of Hindi terminologies.

Title of the Paper IV: Hindi Poetry and Dramas

Course Outcomes:

CO1: Acquire advanced knowledge of ancient and modern poets.
CO2: Heightened the awareness of Historical and Modern Hindi Dramas.
CO3: Extended understanding of basic Hindi grammar.
CO4: Be aware of computer terms in Hindi.

B.(1)
Faculty of Science – Physics

Title of the paper: T-101 Mechanics and Special theory of relativity

Course Outcomes:

CO1: Understand the motion of objects in different frame of references.

CO2: Understand laws of motion, reference frames, and its applications i.e. projectile motion, simple harmonic oscillator, Rocket motion, elastic and inelastic collisions.

CO3: Understand the idea of conservation of angular momentum, central forces and the effective potential.

CO4: Understand the application of central force to the stability of circular orbits, Kepler's laws of planetary motion, Orbital Precession and Rutherford scattering.

CO5: Understand the dynamics of rotating objects i.e. rigid bodies, angular velocity, the moment of inertia, parallel axis theorem, the inertia tensor, the motion of rigid bodies. non-inertial frames: pseudo forces, examples involving the centrifugal force and coriolis force.

CO6: Understand the basics of material properties like, elasticity, elastic constants and their relation, torsion of a cylinder, bending of a beam, cantilever, beam supported at its ends and loaded in the middle.

CO7: Understand the basics of motion of fluid which includes streamlined and turbulent flows, equation of continuity, critical velocity, flow of a liquid through a capillary tube, capillaries in series and parallel, Stokes' formula.

CO8: Develop understanding of special theory of relativity and its applications to understand length contraction, time dilation, relativistic addition of velocities, conservation of momentum and variation of mass, relativistic momentum, relativistic energy, and massenergy relation.

Title of the paper: T-201 Electrostatics, Electromagnetism and Current Electricity

Course Outcomes:

CO1: Understand the basic concepts of electric and magnetic fields.

CO2: Understand the concept of conductors, dielectrics, inductance and capacitance.

CO3: Gain knowledge on the nature of magnetic materials.

CO4: Understand the concept of static and time varying fields.

CO5: Gain knowledge on electromagnetic induction and its applications

CO6: Gain knowledge on EM waves, propagation and their properties.

CO7: Ability to use Maxwell's equations in calculations featuring: both free and stationary electromagnetic waves.

Title of the paper: T-301 Thermal Physics, Radiation and Optics – I

Course Outcomes:

CO1: Understand phenomenon based on light and related theories .
CO2: Get skills to identify and apply formulas of optics and wave physics
CO3: Understand the event like reflection, refraction, interference, diffraction etc
CO4: Understand the applications of diffraction and polarization.
CO5: Understand the applications of interference in design and working of interferometers.
CO6: Understand the resolving power of different optical instruments.
CO7: Understand working of optical fiber and their applications in communication
CO8: Understand the process of thermal conductivity, viscosity and diffusion in gases.

Title of the paper: T-401 Waves, Optics -II and Statistical Physics

Course Outcomes:

CO1: Understand the idea of wave function

CO2: Understand the uncertainty relations

CO3: Understand the Schroedinger wave mechanics and operator formalism

CO4: Solve the Schroedinger equation for simple 1D time-independent potentials

CO5: Appreciate the importance and develop an understanding of angular momentum

CO6: Spot, identify and relate the eigenvalue problems for energy, momentum, angular momentum and central potentials

CO7: Develop the idea of spin and quant

CO8: Understand the basic statistical methods and concepts like probability, random variables, expected value, variance, estimators and common probability distributions.

CO9: Understand the relation between microscopic and macroscopic description through statistical mechanics; know and can apply the laws of thermodynamics and principles of free energy; describe thermodynamic processes and heat engines and master the use of the chemical potential to describe diffusive equilibrium, phase equilibrium and chemical processes.

Title of the paper: T - 5 0 1 Semiconductor devices. Digital electronics, Laser and Fibre optics

Course Outcomes:

CO1: Understand the properties of semi conductors.

CO2: Understand the basics of diode and working of rectifier circuits and characteristics.

CO3: Understand the relationship between semiconductors devices and understand the applications of semiconductor devices

CO4: Understand time and frequency analysis of analog electronic circuits and signals both analytical and with simulations.

CO5: Understanding of digital systems.

CO6: Ability to use IC in different applications like, to verify laws and theorems of Boolean algebra, studying basic combinational circuits ect.

Title of the paper: T-503 Quantum mechanics - I Astrophysics and Nuclear Physics - I

Course Outcomes:

CO1: Develop knowledge and understanding of the concept that quantum states live in a vector space.

CO2: Develop a knowledge and understanding of the meaning of measurement

CO3: Elate this abstract formulation to wave and matrix mechanics

CO4: Develop a knowledge and understanding of perturbation theory, level splitting, and radiative transitions

CO5: Develop a knowledge and understanding of the relation between conservation laws and symmetries

CO6: Develop a knowledge and understanding of the role of angular momentum in atomic and nuclear physics

CO7: Understand the approximate methods for solving stationary and time-dependent problems

CO8: Develop a knowledge and understanding of the scattering matrix and partial wave analysis

CO9: Solve problems in quantum mechanics

CO10: Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations

Title of the paper: T- 601 Quantum Mechanics - II, Atomic spectra and Operational Amplifier

Course Outcomes:

CO1: Be familiar with peripheral ideas about astronomy and astrophysics.
CO2: Show an understanding of general theory of relativity.
CO3: Be familiar with molecular spectroscopy and have gained basic ideas regarding microwavespectroscopy, infrared spectroscopy and Raman Spectroscopy.
CO4: Be familiar with NMR, ESR/TEM etc. and understand the uses in physics in medicalfield.
CO5: List and explain the different number system.
CO6: Show an understanding of different logic gates using truth table.
CO7: Analyze and design different adder circuits.
CO8: Analyze, design and implement combinational logic circuits.
CO9: Analyze, design and implement sequential logic circuits.

Title of the paper: T- 603 Solid state, Molecular Physics and Nuclear Physics - II

Course Outcomes:

CO1: Understand the working of nuclear detectors, counters and realize the importance ofcosmic rays and its effects on earth and fundamental particles.
CO2: Become familiar with nuclear particles and different particle accelerators.
CO3: Have a deep knowledge about nuclear fission and nuclear fusion, and the relevanceof nuclear transformation.
CO4: Understand the origin of atmosphere/greenhouse effect /ozone layer.
CO5: Sketch and explain the basic block of communication system.
CO6: Understanding the principles of modulation and explain the different modulationtechniques.
CO7: Knowledge about the theory and operation of radio systems and super heterodynereceivers.
CO8: Show the skills of using different modulation and demodulation techniques used inanalog communication.
CO9: Show an understanding of GSM, CDMA concepts, architecture, frame structure,system capacity and services.

B. (2)
Faculty of Science - Chemistry

Title of the paper: T-1.3 ATOMIC STRUCTURE, BONDING, GENERAL ORGANICCHEMISTRY & ALIPHATIC HYDROCARBONS

Course Outcomes:

CO-1: Introduction of quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves and shapes of various orbitals

CO-2: Learn to draw the plausible structures and geometries of molecules using Radius Ratio Rules, VSEPR theory and molecular orbital diagrams

CO-3: Understand the importance and application of chemical bonds, intermolecular and intramolecular weak chemical forces and their effect on melting points, boiling points, solubility and energetics of dissolution

CO-4: Learn the concept and periodic trends in atomic radii, ionic radii, ionization energy and electron affinity of elements

CO-5: Understand the concept of lattice energy

CO-6: Learn Band theory and its application in rationalizing the conductivity of metals, semiconductors and insulators

Title of the paper: T-2.3 CHEMICAL ENERGETICS, EQUILIBRIA &FUNCTIONAL ORGANIC CHEMISTRY

Course Outcomes:

CO-1: To understand the basics and advanced concepts related to Chemical Energetics

CO-2: To understand the basics of Acids and Bases and calculate the pH of various acidic and Basic solutions

CO-3: To understand the concept of Buffer Solutions and can prepare the Buffer solutions as per the requirement

CO-4: To derive the various mathematical expressions to define the physical properties of Solids, Liquids and Gases

CO-5: To derive the various equations dealing with the calculation of pH of Acids and Bases, Buffer Solution

Title of the paper: T-3.3 SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC CHEMISTRY-II

Course Outcomes:

CO1: This course has been designed to impart an insight into the basic principles of phase equilibrium, electrochemistry and functional group chemistry.

CO2: The students will be made to understand the properties of ideal and non ideal solutions, the basic concepts of electrochemistry and its applications.

CO3: They will also be taught the preparation and reactions of acids and amines along with the classification and structure of common organic compounds

Title of the paper: T-4.3 COORDINATION CHEMISTRY, STATES OF MATTER & CHEMICAL KINETICS

Course Outcomes:

CO1: This course is designed to impart knowledge regarding coordination compounds, various states of matter and kinetics of chemical reactions.

CO2: In this course the students are expected to lean about the behavior of transition and inner transition elements.

CO3: Students will develop a comprehensive knowledge of kinetic theory of gases, concepts of condensed states of matter and the formation and stability of coordination complexes.

Title of the paper: T-5.1 ORGANIC CHEMISTRY

Course Outcomes:

CO1:	Identify the symmetry elements and symmetry operations in molecules
CO2:	Explain the criteria for chirality and discuss axial, planar and helical chirality
CO3:	Discuss the methods of determination of relative and absolute configuration
CO4:	Discuss Racemization and Resolution techniques
CO5:	Determine the configuration in E and Z isomers
CO6:	Explain the mechanism of electrophilic addition to carbon carbon double bond and elimination reactions
CO7:	Discuss the various methods of determination of reaction mechanism
CO8:	Discuss the conformations in saturated and unsaturated acyclic compounds and the factors affecting the stability and reactivity of conformations
CO9:	Explain the general methods in structure determination of terpenoids and alkaloids
CO10:	Explain the nomenclature, synthesis and reactivity of heterocyclic compounds

Title of the paper: T-5.2 PHYSICAL CHEMISTRY

Course Outcomes:

CO1:	Write down the concept of entropy. Describe 3rd law of thermodynamics and evaluation of absolute entropy from heat capacity data.
CO2:	Write down Gibb's equations for non equilibrium system and conditions for material and phase equilibrium. Derive Clausius- Clapeyron equation and equation for equilibrium constant of ideal gas reactions.
CO3:	Give the concept of partial molar properties and chemical potential. Derive Gibb's Duhem equation.
CO4:	Explain chemical cell and concentration cell(with and without transfer). Derive the expression of liquid junction potential.
CO5:	Write down the applications of EMF measurement. Define electrode polarization , decomposition potential and concentration over potential.
CO6:	Write down Debye – Huckel theory of electrolytic solution and Bjerrume theory of ion association. Derive Debye – Huckel – Onsagar equation.
CO7:	Write down the concept of black body radiation. Describe operators, commutation of operators eigen function, eigen value and well behaved function.
CO8:	Write down the postulates of quantum mechanics. Derive the expression of wave function and energy of particles moving in one and three dimensional box.
CO9:	Write down collision theory and transition state theory of reaction rate. Describe Lindemann's theory of unimolecular reaction.
CO10:	Write down linear free energy relationship – Hammett anf Taft equation. Describe primary and secondary sat effect, reactivity – selectivity principle and Hammond postulate

Title of the paper: T-6.1 INORGANIC CHEMISTRY

Course Outcomes:

CO1: Describe the types of polymers, polymerization techniques and applications oforganic and inorganic polymers.
CO2: Understand the basic concepts of photochemistry and photochemical reactions.
CO3: Understand the mechanism of radiochemical reactions and extent of radiolysis.
CO4: Predict the mechanism of inter conversion, ascending and descending of carbohydrates.
CO5: Explain the biological importance and functions of amino acids, peptides and proteins,
CO6: Describe the structural aspects and chemical properties of carboxylic acids and them derivatives.
CO7: Conduct independent experiments using modern instruments.

Title of the paper: T-6.2 BIOCHEMISTRY

Course Outcomes:

CO1: The students will learn about the chemical structures of carbohydrate, and their structural and metabolic role in cellular system.
CO2: The students will learn about structure and function of lipids, circulating lipids and inflammatory lipid mediators etc. Theywill also learn about primary, secondary, tertiary, quaternarystructure of proteins.
CO3: The students will understand about the structure and function of nucleosides and nucleotides.
CO4: The course will aid the students in understanding other accessory molecules like vitamins, plant and animal harmones,

B.(3)

Faculty of Science – Mathematics (Semester I-IV)

Title of the Paper: 1.1 - Algebra and Calculus-1

Course Outcomes:

CO1:	Show an Recapitulation of Limit and Continuity, Differentiability of functions
CO2:	Exhibit Reduction formulae for Sinnx,Cosnx,Tannx,Secnx,Cotnx,Cosecnx, SinmxCosnx.Differentiation under the integral sign.
CO3:	Exhibit the skills in drawing asymptotes for the graphs of functions.
CO4:	Be familiar with Homogeneous and non-Homogeneous systems of 'm' linear equations in 'n' unknowns, criterion for uniqueness of solutions.
CO5:	Exhibit the skills in the Eigen values and Eigen vectors of a square matrix, standard properties, reduction of matrix to diagonal form, Cayley-Hamilton theorem (with proof), and applications.

Title of the Paper: 2.2 - Differential Equations

Course Outcomes:

CO1:	Exhibit the ability in Basic theory of linear differential equations (second and Higher order) , Wronskian and its properties.
CO2:	Formation of partial differential equations, equations of first order, Lagrange's linear equations Pp+Qq=R, Standard types of first order non-linear PDEs and Equations reducible to standard form, Charpit's method.
CO3:	Basic theory of linear differential equations (second and Higher order), Wronskian and its properties.
CO4:	Cauchy-Euler differential equations. Solutions of second order ordinary differential equations with variable coefficients
CO5:	Show improved skills to evaluate double and triple integrals of the functions.

Title of the Paper: 3.1 - Real Analysis

Course Outcomes:

CO1: Show an improved knowledge of Recapitulation of Sets, relations, functions and number system

CO2: Exhibit the skills to test the convergence and divergence of the series.

CO3: Show an improved ability to solve differential equations by using different methods.

CO4: Be familiar with application of Recapitulation of Limits, continuity and differentiability.

CO5: Learn Definition of a sequence, bounded sequences, limit of a sequence, limit points of a sequence, sub sequences, convergent, divergent and oscillatory sequences, monotonic sequences

Title of the Paper: 4.1 - Algebra and Calculus-2

Course Outcomes:

CO1: Definition of line integral and basic properties, examples on evaluation of line integrals.

CO2: Scalar field, Gradient of a scalar field, directional derivatives, surfaces-tangent plane and normal to the surface, Vector field, divergence and curl of a vector field, geometrical meaning, solenoidal and irrotational fields, vector identities

CO3: learn about the groups and subgroups Zn integers modulo units of multiplications modulo.

CO4: Fundamental Theorem of Homomorphism, Isomorphism Theorems, Automorphisms, Cayley's theorem on permutation groups.

CO5: Exhibit knowledge about harmonic properties, and some elementary functions of complex numbers.

Title of the Paper: 5.1- Advanced Algebra and Numerical Methods

Course Outcomes:

CO1:	Explain basic concepts Rings – Examples, Integral Domain, Division rings, Rings of matrices, Fields, Polynomial rings, Subrings, Subfields.
CO2:	Linear transformations, null space, range, rank and nullity of a linear transformation.
CO3:	Numerical solutions of Algebraic and transcendental equations– Bisection method The method of false position – Newton – Raphson method.
CO4:	Numerical solutions of first order linear differential equations Picard's method, Euler – Cauchy method – Euler's modified method – Runge-Kutta fourth order method
CO5:	Exhibit improved skills in the proof writing and logical thinking.

Title of the Paper: 5.2(a)- Analysis and Integral Transforms

Course Outcomes:

CO1:	Learning about Improper Integrals: Gamma and Beta functions and results following the definition, Connection between Beta and gamma functions – applications of evaluation of integrals.
CO2:	Improved Fourier Series: Introduction, periodic functions, Trigonometric Fourier series of functions
CO3:	Convolution theorem (without proof). Applications of Laplace Transform to the solution of differential equations.
CO4:	Laplace Transforms and Inverse Laplace Transforms. Laplace transforms of derivatives and integrals. Shifting theorems. Convolution theorem (without proof). Applications of Laplace Transform to the solution of differential equations.
CO5:	Application of Fourier transforms to ODEs and PDEs.

Title of the Paper: 5.2(b)- Probability and Statistics

Course Outcomes:

CO1:	Be familiar with definition Curve fitting (least square method)- and other curves of the form. Correlation and RegressionCorrelation coefficient, regression lines and regression coefficient
CO2:	Understanding Random Variables: Discrete, continuous and mixed random variables, probability mass, probability density.
CO3:	Special Distributions: Poisson distribution, Exponential and Normal distributionstandard normal distribution and normal probability curve
CO4:	Exhibit the skills Recapitulation of measures of central tendency, measures of dispersion, definition of probability, conditional probability, Bayes' theorem, random variables, binomial distribution.
CO5:	Ability to solve probability and moment generating function.

Title of the Paper: 6.1: Complex Analysis and Numerical Methods

Course Outcomes:

CO1: Show familiarity Functions of a complex variable, limits, theorems on limits, continuous functions, differentiability

CO2: Exhibit knowledge about Power Series: Absolute convergence of power series, circle and radius of convergence of power series, sum function of a power series.

CO3: Show improved skills Complex Integration: Introduction, complex line integral-examples and properties, Cauchy's integral theorem, Winding number.

CO4: Show knowledge of Finite differences– Forward and backward differences – shift operator –Interpolation – Newton – Gregory forward and backward interpolation formulae

CO5**:** Exhibit familiarity with Numerical integration– General quadrature formula – Trapezoidal Rule Simpson's 1/3 rule – Simpson's 3/8 the rule, Weddle's rule. Error analysis of these methods.

Title of the Paper: 6.2(a): Number Theory

Course Outcomes:

CO1: Be familiar The Division Algorithm, the Greatest Common Divisor, The Euclidean Algorithm, Prime numbers and their properties

CO2: Exhibit an improved skills in solving canonical, non-canonical forms of LPP and dual form of LPP.

CO3: Basic Properties of Congruences and applications, Binary and Decimal Representations of Integers.

CO4: Updating Multiplicative Functions, The Sum and Number of Divisors, The Möbius Inversion Formula, The Greatest Integer Function, Euler's Phi-Function, Euler's Generalization of Fermat's Theorem, Properties of Phi-Function.

CO5: Fermat's Little Theorem and Pseudo primes, Wilson's Theorem, Fermat's numbers

Title of the Paper: 6.2b: Linear Programming

Course Outcomes:

CO1: Show the ability to Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format.

CO2: Exhibit the knowledge of Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format.

CO3: Solve PDE by using Lagrange's method, Carpet's method and special type of firstorder equations.

CO4: Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, degeneracy, introduction to artificial variables.

CO5: Farka's theorem. Complementary Slackness theorem, economic interpretation of the dual, Dual simplex method, sensitivity analysis.

B. (4)
Faculty of Science – Botany

Title of the Paper: Paper1 – Biodiversity

Course Outcomes:

CO1: Understanding the diversity & distribution of microbes.
CO2: Appreciation of the ultra-structure, reproductive features and mode of transmissionof viruses & bacteria.
CO3: Analysis of the plant diseases caused by microbes.
CO4: Understanding the diversity, distribution, thallus organization, reproduction andeconomic significance of Blue greens & algal representatives.
CO5: Articulation of the economic importance of lower cryptogams.

Title of the Paper: Paper2 - Plant Ecology Phyto Geography Pt Pathology

Course Outcomes:

CO1: Exhibit the learning of the basic functioning pattern of plant system.
CO2: Evaluate the role of Biological molecules in various metabolic activities.
CO3: Exhibit the learning the structure, functioning pattern and operative systems of Ecosystem.

Title of the Paper: Paper-3–Embryology of Angio sperms & Tissue Culture

Course Outcomes:

CO1: Show an understanding of the diversity & distribution of cryptogams.
CO2: Exhibit an understanding of the distribution, morphology, reproduction, life cycleand economic significance of Pteridophytes and Gymnosperms.
CO3: Demonstrate learning of the stages of formation and development of plant embryo

Title of the Paper: Paper4 – Anatomy Morphology of Angiosporns, pt Propagation

Course Outcomes:

CO1: Show an understanding the morphology of angiosperms with a special reference toflower and its various parts in detail.
CO2: Exhibit the learning of the Identification, Nomenclature & classification of Plants.
CO3: Evaluate the Family level organization, with the help of APG system of classification.
CO4: Show an understanding of the distribution, cultivation pattern, extraction and economical importance of various Plants & Plant products.

Title of the Paper: Paper5 Taxonomy & Economic Botany & Ethnobotany

Course Outcomes:

CO1: Exhibit the learning of the basic functioning pattern of plant system.
CO2: Evaluate the role of Biological molecules in various metabolic activities.
CO3: Exhibit the learning the structure, functioning pattern and operative systems ofEcosystem.

Title of the Paper: Paper6: Cytology, Genetics, Plant breeding & Evolution

Course Outcomes:

CO1: Understanding the concept of cell structure with respect to biological molecules,organelles & membranes.
CO2: Evaluate the structure and role of genes in the pattern of inheritance.
CO3: Exhibit the learning of the concept of inheritance & variations

Title of the Paper: Paper7 – Plant Physiology & Metabolism

Course Outcomes:

CO1: Show an understanding of the concept & mechanism of vital processes likePhotosynthesis,Translocation, Respiration & growth.
CO2: Exhibit an understanding of the plant adaptations to various ecological conditions &types of vegetation.
CO3: Exhibit an improved knowledge of the environmental pollution and its consequences.
CO4: Evaluate of the biodiversity and its conservation.

Title of the Paper: Paper8 – Molecular biology Genetic engineering, Bio informatics & Bio-technology

Course Outcomes:

CO1: Analyze the internal Structures of Plant organs.

CO2: Learning the basic concept of Microbiology.

CO3: Show an understanding of the principles of Plant biotechnology.

CO4: Exhibit the skills in application of the tools & techniques in Plant propagation.

CO5: Evaluate the structure and role of genes in the pattern of inheritance.

CO6: Exhibit the learning of the concept of inheritance & variat

B.(5)

Faculty of Science – Biotechnology

Title of the paper: Paper1.3- CELL BIOLOGY AND GENETICS

Outcomes:

CO1: Understand chemical reactions and structures of biological molecules essential for life.

CO2: Demonstrate the theoretical knowledge and practical application of UV/VIS, IR, and NMR spectroscopy, Colorimetry, nucleic acid purification, electrophoresis, SDS- PAGE protein electrophoresis, Western blotting, protein purification, Centrifugation.

CO3: Exhibit skills in applying Beer Lambert's Law.

CO4: Conversant about classification of Biomolecules.

Title of the paper:Paper2.3 - Microbiology & Biostastistics

Course Outcomes:

CO1: Trace and relate the evolution of cells.

CO2: Show the conversant ability on different organelles present within the cell that has anevolutionary significance with respect to the changing environment, adaptations, improvisation of survival skills and the changing surroundings based on theiractivities.

CO3: Show an ability in understanding cell signaling, cell interactions

CO4: Describe the roles biostatistics serves in the discipline of public health.

CO5: Apply basic statistical concepts commonly used in public health and health Sciences

CO6: Demonstrate basic analytical techniques to generate results

CO7: Interpret results of commonly used statistical analyses in written summaries

Title of the paper3.3 - Biochemistry and Biophysical Techniques

Course Outcomes:

CO1: Describe the microbial world, its beginning with basics of evolution of microorganisms on early earth life & its gradual transformation to most resistant forms.

CO2 : students will be able to analyse metabolic problems and will be able to approach a research problem specifically.

CO3: understanding the significance of biochemical tests.

CO4: Students will be able to carry biomolecular estimation based on the coloration reaction.

CO5: Analyze the dark side of microbial world that is microbe & host interaction leading to disease is explained with respect to few plant pathogens, animal pathogens etc, Pathogenesis caused by invading bacteria and few secreted microbial products suchas toxin resulting in food poisoning and also the role played by micro-organisms in food spoilage, prerequisites contributing to food spoilage.

CO6 : Suggest remedial measures of preservation of food through various methods.

Title of the paper4.3 - Molecular Biology and Bioinformatics

Course Outcomes:

CO1: Explain the inheritance patterns of characters from one generation to another.

CO2: Show the expertise in Chromosomal mapping or gene mapping.

CO3: Analyze how modifications of chromosomes and genes causes diseases in humans.

CO4: Show familiarity with the changes in a gene that could happen suddenly in anorganism.

Title of the paper:5.1 – Genetic Engineering

Course Outcomes:

CO1: Show an understanding of the distribution of medicinal plants at global national andlocal levels.
CO2: Analyze the role of medicinal plants in different medicinal systems.
CO3: Be able to understand the basic problems, methods, and approaches to the field of bioethics.
CO4: Learn about Mendelian principles
CO5 : Know about gene mapping methods & Extra chromosomal inheritance
CO6 : Familiarize about Evolution & Emergence of evolutionary thoughts
CO7 : Gain knowledge on Plant breeding techniques.

Title of the paper: 5.2-Immunology

Course Outcomes:

CO1: Compare the age old and conventional methods of plant breeding which are quiet unsuccessful for feeding the ever-growing populations with the modern technologiesfor plant improvisation.
CO2: Apply the nature's rule in plant development in creating micro propagation from different plant parts.
CO3: Evolve methods for ecological conservation - artificial means, modification of plants.
CO4: Show familiarity with the knowledge on phytoremediation and bio extraction.

Title of the paper:6.1 – Plant and Animal cell technology

Course Outcomes:

CO1: Show a thorough knowledge of the basics of initiating cell culture by tissue disaggregation and the development of primary culture, characterizing primary cell lines, & basic equipment's, media, physical factors, asepsis design of lab.
CO2: Reflect the awareness of large scale culture of cell in Bioreactor for monolayer & suspension culture is studied.
CO3: Apply cell cultures in different fields like in vitro fertilization.
CO4: Use various transgenic approaches used to improve animal as bioreactor
CO5: Produce commercially important proteins from animal cell and use gene therapy andmechanism of gene therapy.

CO6: Skillful in using various bio informatics tools to access biological database.

Title of the paper:6.2 – Industrial and Environmental biotechnology

Course Outcomes:

CO1: Demonstrate the knowledge of the working principle, instrumentation, and applications of an age old technique, chromatography and also show how this traditional method has been modernised into the present day HPLC, UPLC etc.

CO2 : Cell types and major cell constituents. Enzymes and Nucleic acids: their structure and functions.

CO3 : Metabolism of biogenic compounds. Anabolic and catabolic pathways.Aerobic respiration of organic compounds: glycolysis, Krebs cycle and oxidative phosphorylation.

CO2: Analyze the working principle, instrumentation and applications of techniques of, spectroscopy.

CO3: Apply the principles and methodology of different centrifugation techniques.

CO4: Show the familiarity of the usage of radio isotopes that has marveled modernbiology, environment, medicine as well as in routine biological assays.

CO5: Employ spectroscopy for the identification of unknown compounds in the biologicalsamples.

CO6: Be familiar with the phases in clinical trials involved in drug developmen

B.(7)
Faculty of Computer Science:

Title of the paper: BSCcT1.1: Computer Concepts & OOPS using C++

Course Outcomes:

CO1: Be familiar with definition of computer and different parts of the computer andexhibit the skills to work in the computer.
CO2: Show the ability to identify the input/out devices and its working pattern.
CO3: Be familiar with hardware and software used in the various fields of IT industry.
CO4: Be familiar with definition of programming and different types programminglanguages and exhibit the skills to solve problem using algorithm and flow charts.

Title of the paper: BSCcT2.1: Data Structures using C++

Course Outcomes:

CO1: Be familiar with basic concepts of data structures and algorithms.
CO2: Show the ability to understand concepts about searching and sorting techniques.
CO3: Be familiar with basic concepts about stacks, queues, lists, trees and graphs.
CO4: Exhibit the skills in writing algorithms and step by step approach in solvingproblems with the help of fundamental data structures.
CO5: Be familiar with concept of Object Oriented Programming

Title of the paper: BSCcT3.1: Operating System & Unix

Course Outcomes:

CO1: Be familiar with Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.
CO2: Show the ability to understand the fundamentals of Operating Systems.
CO3: Be familiar with the insight on to the distributed resource management components viz. The algorithms for implementation of distributed shared memory, recovery and commit protocols.
CO4: Exhibit familiarity with the components and management aspects of Real time, Mobile operating Systems.

Title of the paper: BSCcT4.1: Software Engineering & Database Management System

Course Outcomes:

CO1: Be familiar with basic database concepts, including the structure and operation of the relational data model.

CO2: Show an ability to understand and successfully apply logical database designprinciples, including E-R diagrams and database normalization.

CO3: Be familiar with Design and implement a small database project using MicrosoftAccess.

CO4: Be familiar with definition of software engineering and the methods of software development.

CO5: Show the ability to be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility.

CO6: Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment.

Title of the paper: BSCcT5.1: Java Programming

Course Outcomes:

CO1: Be familiar with model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism.

CO2: Show the ability to understand fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries ofobject collections.

CO3: Be familiar with the statement of a business problem and determine suitablelogic for solving the problem; then be able to proceed to code that logic as aprogram written in Java.

CO4: Exhibit the skills to test, document and prepare a professional lookingpackage for each business project using java doc.

Title of the paper: BSCc5.3: Web Technology

Course Outcomes:

CO1: Be familiar with knowledge of Web Application Terminologies, Internet Tools.

CO2: Show the ability to provide in-depth understanding of the tools and technologiesnecessary for Web application design and development.

CO3: Be skilled to select and apply markup languages for processing,

identifying, andpresenting information in web pages.

CO4: Exhibit the skills in using scripting languages and web services to add interactivecomponents to web pages.

CO5: Show an ability to design and implement websites with good aesthetic sense ofdesigning.

Title of the paper: BSCsT6.1: Python Programming

Course Outcomes:

CO1: Be skilled in creating, debugging and testing a software application using the Pythonprogramming language.

CO2: Show the ability to study Python Fundamentals to advanced concepts like OOPS.

CO3: Be familiar with Exception handling, multi-threading, Networking.

CO4: Exhibit the skills in Database Connectivity and Graphical User Interface.

Title of the paper: BSCsT6.3: Computer Networks

Course Outcomes:

CO1: Be familiar with to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.

CO2: Show the ability to understand the architectural principles of computer networkingand compare different approaches to organising networks.

CO3: Be familiar with key networking protocols and their hierarchical relationship in thecontext of a conceptual model such as the OSI and TCP/IP framework.

CO4: Exhibit the skills of Identify core networking and infrastructure components and theroles they serve.

B.(8)
Faculty of Science – Microbiology

Title of the paper: Paper1.3- Fundamentals of Microbiology & Biophysics

Course Outcomes:

CO1: Understand chemical reactions and structures of biological molecules essential for life.

CO2: Demonstrate the theoretical knowledge and practical application of UV/VIS, IR, and NMR spectroscopy, Colorimetry, nucleic acid purification, electrophoresis, SDS- PAGE protein electrophoresis, Western blotting, protein purification, Centrifugation.

CO3: Exhibit skills in applying Beer Lambert's Law. CO4: Conversant about classification of Biomolecules.

Title of the paper:Paper2.3 - Microbial Diversity, Taxonomy & Culture Techniques

Course Outcomes:

CO1: Trace and relate the evolution of cells.

CO2: Show the conversant ability on different organelles present within the cell that has anevolutionary significance with respect to the changing environment, adaptations, improvisation of survival skills and the changing surroundings based on theiractivities.

CO3: Show an ability in understanding cell signaling, cell interactions

CO4: Describe the roles biostatistics serves in the discipline of public health.

CO5: Apply basic statistical concepts commonly used in public health and health Sciences

CO6: Demonstrate basic analytical techniques to generate results

CO7: Interpret results of commonly used statistical analyses in written summarie

Title of the paper3.3 - Microbial Metabolism, Microbial Genetics & Biostatistics

Course Outcomes:

CO1: Describe the microbial world, its beginning with basics of evolution of microorganisms on early earth life & its gradual transformation to most resistant forms.

CO2 : Students will be able to analyse metabolic problems and will be able to approach a research problem specifically.

CO3: Understanding the significance of biochemical tests.

CO4: Students will be able to carry biomolecular estimation based on the coloration reaction.

CO5: Describe the roles biostatistics serves in the discipline of public health.

CO6: Apply basic statistical concepts commonly used in public health and health Sciences

CO7: Interpret results of commonly used statistical analyses in written summaries.

Title of the paper4.3 - Molecular Biology, Genetic Engineering & Bioinformatics

Course Outcomes:

CO1: Explain the inheritance patterns of characters from one generation to another.

CO2: Show the expertise in Chromosomal mapping or gene mapping.

CO3: Analyze how modifications of chromosomes and genes causes diseases in humans.

CO4: Show familiarity with the changes in a gene that could happen suddenly in anorganism.

Title of the paper:4.9 – Microbes and Mankind

Course Outcomes:

CO1: Analyze the dark side of microbial world that is microbe & host interaction leading to disease is explained with respect to few plant pathogens, animal pathogens etc,

CO2: Pathogenesis caused by invading bacteria and few secreted microbial products such as toxin resulting in food poisoning and also the role played by micro-organisms in food spoilage, prerequisites contributing to food spoilage.

CO3 : Suggest remedial measures of preservation of food through various methods.

CO4: Learn about Mendelian principles

CO5 : Know about gene mapping methods & Extra chromosomal inheritance

CO6 : Familiarize about Evolution & Emergence of evolutionary thoughts

Title of the paper: 5.1- Agricultural and Environmental Microbiology

Course Outcomes:

CO1: Compare the age old and conventional methods of plant breeding which are quiet unsuccessful for feeding the ever-growing populations with the modern

technologiesfor plant improvisation.

CO2: Apply the nature's rule in plant development in creating micro propagation from different plant parts.

CO3: Evolve methods for ecological conservation - artificial means, modification of plants.

CO4: Show familiarity with the knowledge on phytoremediation and bio extraction.

Title of the paper:5.2 – Food and Dairy Microbiology

Course Outcomes:

CO1: Illustrate the role of microorganisms in food safety.

CO2: Cultivate and enumerate microorganisms from various food samples.

CO3: Compare various physical and chemical methods used in the control of microorganisms.

CO4: Show a thorough knowledge of the basics of initiating cell culture by tissue disaggregation and the development of primary culture, characterizing primary cell lines, & basic equipment's, media, physical factors, asepsis design of lab.

CO5: Reflect the awareness of large scale culture of cell in Bioreactor for monolayer & suspension culture is studied.

CO6: Apply cell cultures in different fields like in vitro fertilization.

CO7: Skillful in using various bio informatics tools to access biological database.

Title of the paper:6.1 : Immunology and Medical Microbiology

Course Outcomes:

CO1: Students will gain knowledge about the different cell organelles of microorganisms and their detailed functions.

CO2: Students will also study the growth and control of microbes as well as different bacteriological techniques involved in microbiology.

CO3: Compare the age old and conventional methods of plant breeding which are quiet unsuccessful for feeding the ever-growing populations with the modern technologies for plant improvisation.

CO4: Apply the nature's rule in plant development in creating micro propagation from different plant parts.

CO5: Evolve methods for ecological conservation - artificial means, modification of plants.

CO6: Show familiarity with the knowledge on phytoremediation and bio extraction.

Title of the paper: 6.2 : Industrial and Microbial Technology

Course Outcomes:

CO1: Demonstrate the knowledge of the working principle, instrumentation, and applications of an age old technique, chromatography and also show how this traditional method has been modernised into the present day HPLC, UPLC etc.

CO2 : Cell types and major cell constituents. Enzymes and Nucleic acids: their structure and functions.

CO3 : Metabolism of biogenic compounds. Anabolic and catabolic pathways.Aerobic respiration of organic compounds: glycolysis, Krebs cycle and oxidative phosphorylation.

CO2: Analyze the working principle, instrumentation and applications of techniques of microbial technology.

CO3: Apply the principles and methodology of different centrifugation techniques.

CO4: Show the familiarity of the usage of radio isotopes that has marveled modernbiology, environment, medicine as well as in routine biological assays.

CO5: Employ spectroscopy for the identification of unknown compounds in the biologicalsamples.

CO6: Be familiar with the phases in clinical trials involved in drug development.

B.(9)
Faculty of Science – ZOOLOGY

Title of the paper: 1.7-I Sem. Paper No.-I Animal T Diversity

Course Outcomes:

CO1: To classify Phylum Porifera with taxonomic Keys
CO2: To describe the Phylum Coelenterata and its Polymorphism
CO3: To identify the given Mollusca with respect to economic importance
CO4: To describe general characters of Nemathelminthes and their parasitic Adaptation
CO5: To explain classification of protozoa and diseases caused by them
CO6: To explain general characters of Arthropoda and metamorphosis in insects.

Title of the paper: 2.7-II Sem. Paper No.-II Comparative Anatomy And Developmental Biology of Vertebrates

Course Outcomes:

CO1: To identify the characters of Amphibia and its parental care
CO2: To describe the Phylum Mammalia and its aquatic adaptations CO3-To identify the poisonous and non poisonous snakes
CO4: To write down classification of Aves and Flight adaptation in birds
CO5: To identify the formation of fetal membranes in chick embryo and their function.

Title of the paper: 3.7-III Sem Paper No.-III Physiology and Human Anatomy

Course Outcomes:

CO1: To describe the types of Digestion
CO2: To explain the process of carbohydrates, protein, lipid digestion
CO3: To describe the structure of mammalian lungs
CO4: To describe the mammalian heart and its functioning
CO5: How are the animals classified on the basis of excretion of nitrogenous waste products
CO6: To describe Sliding Filament theory of muscle contraction.

Title of the paper: 4.7-IV Sem. Paper No.-IV Insects Vectors and Diseases

Course Outcomes:

CO1: Development of concept about hexapod classification, different major insect orders and their major familes
CO2: Development of knowledge about major insect pests of crops, forests, stored grains etc
CO3: To develop concept about insect pest status, pest control methods, IPM strategy in different commercial crops
CO4: Development of depth knowledge about insect vector biology, disease transmission, pathogenicity, endemicity of disease and about different control measures.
CO5: Identification of major insect pests and vectors responsible for disease transmission
CO6: Knowing the physiology, life history in efficacious management of insect pests and vectors.
CO7: Role in pollination, aesthetic value, insect-based drug and products.

Title of the paper: 5.7-V Sem. Paper No.- V Genetics and Evolutionary Biology

Course Outcomes:

CO1: To describe the types of Digestion
CO2: To explain the process of carbohydrates, protein, lipid digestion
CO3: To describe the structure of mammalian lungs
CO4: To describe the mammalian heart and its functioning
CO5: How are the animals classified on the basis of excretion of nitrogenous waste products
CO6: To describe Sliding Filament theory of muscle contraction.

Title of the paper: 5.8 –V Sem. Paper No.VI Cell Biology and Immunology

Course Outcomes:

CO1: Descibe cell cycles and its regulation
CO2: Write down molecular biology techniques
CO3: Explain causes and role of extinction in evolution
CO4: To identify chromosomal mutations and in borne errors of metabolism
CO5: To describe differences between prokaryotic and Eukaryotic cells.

Title of the paper: 6.7- VI Sem. Paper No. -VII Applied Zoology

Course Outcomes:

CO1: To explain Hatchery design and management

CO2: To describe the techniques in Induced breeding

CO3: To describe the structure and functioning of Blood

CO4: To give the Importance of Biopsy and Autopsy

Title of the paper: 6.8- VI Sem. Paper No.-VIII Environmental Biology and Ethology

Course Outcomes:

CO1: Apply the scientific method and quantitative techniques to describe, monitor and understand environmental systems.

CO2: Use interdisciplinary approaches such as ecology, economics, ethics and policy to devise solutions to environmental problems.

CO3: Be proficient in ecological field methods such as wildlife survey, biodiversity assessment, mathematical modeling and monitoring of ecological systems.

CO4: Use technology, such as geographical information systems and computer programming, to assist in problem solving.

CO5: Effectively understand and convey scientific material from peer-reviewed sources.

B.(10)
Faculty of Science – ELECTRONICS:

Title of the paper: PAPER-I: NETWORKANALYSIS , ANALOG and DIGITAL ELECTRONICS

Course Outcomes:

CO1: Apply the concept and knowledge of integrated circuit chips to develop new systems.

CO2: Apply practical knowledge to solve real life problems of the society Student is aware of working of advanced digital communication systems.

CO3: Student will become capable of designing various modulation circuits used commonly Student is aware of working basic cellular telephony and various networks.

CO4: To analyze the Circuits in time and frequency domain

CO5: To study network Topology, network Functions, two port network.

CO6: To synthesize passive network by various methods.

Title of the paper: PAPER-II: LINEAR AND DIGITAL INTEGRATEDCIRCUITS

Course Outcomes:

CO1: Understand of the course and create scientific temperament and give exposure to the students for independent use of integrated circuit chips for innovative applications.

CO2: Student is aware of how TV and mobile channels work with satellites for global coverage.

CO3: To understand the basic concepts of operational amplifier and its various applications.

CO4: To understand the basics of PLL and its practical applications.

CO5: To know about analog multlipliers.

CO6: To know about various analog switches and different A/D and D/A convertors.

CO7: To understand the concepts of switched capacitor filters,Voltage regulator and various amplifiers

Title of the paper: PAPER-III: COMMUNICATION ELECTRONICS

Course Outcomes:

CO1: Define the basic concepts of probability, random variable, and correlation function.

CO2: Understand the cumulative distribution function, probability density function, Power spectral density and Central limit theorem for random signal.

CO3: Apply the various coding techniques to determine the channel efficiency.

CO4: Analyze the spectral characteristics by Fourier analysis, filters and block codes.

Title of the paper: PAPER-IV: MICROPROCESSOR AND C-PROGRAMMING

Course Outcomes:

CO1: Understand the taxonomy of microprocessors and knowledge of contemporary microprocessors.

CO2: Describe the architecture, bus structure and memory organization of 8085 as well as higher order microprocessors.

CO3: Explore techniques for interfacing I/O devices to the microprocessor 8085 including several specific standard I/O devices such as 8251 and 8255.

CO4: Demonstrate programming using the various addressing modes and instruction set of 8085 microprocessor

CO5: Design structured, well commented , understandable assembly language programs to provide solutions to real world control problems

Title of the paper: PAPER-V: 8051 MICROCONTROLLER AND INTERFACING

Course Outcomes:

CO1: Introduction to microprocessor where students learn about Block diagram of a computer-Function of each block, Hardware, Software, Firmware

CO2: Microprocessor 8085 - Features of 8085, Pin diagram of 8085

CO3: Generation of control signals, clock and reset circuits, Bus drivers-.

CO4: Instruction set architectures and addressing modes.

Title of the paper: Paper-VI: PHOTONIC DEVICES AND POWERELECTRONICS

Course Outcomes:

CO1: Define the basic concepts of power electronics components.

CO2: Understand the working operation and characteristics of different power electronics devices such as rectifiers, choppers, inverters, converters.

CO3: Demonstrate the applications of various power electronics devices.

CO4: Analyze the parameters of waveforms generated by various power electronics devices.

Title of the paper: PAPER-VII: ELECTRONIC INSTRUMENTATION AND VERILOG

Course Outcomes:

CO1: Recognize the evolution and history of units and standards in Measurements.

CO2 : Identify the various parameters that are measurable in electronic instrumentation.

CO3 : Employ appropriate instruments to measure given sets of parameters.

CO4 : Practice the construction of testing and measuring set up for electronic systems.

CO5: To have a deep understanding about instrumentation concepts which can be applied to Control systems.

CO6 : Relate the usage of various instrumentation standards.

PAPER-VIII: TRANSMISSION LINES, ANTENNA AND WIRELESSNETWORKS

Course Outcomes:

CO1: The student will be able to Understand how the electromagnetic wave propagate from an antenna. Learn the concept of RF feeding to an antenna.

CO2: To calculate the various parameters of antenna to know its efficiency. Study the various types of antennas used in recent communication systems.

CO3: Understand the wave propagation through space.

CO4: Discuss the fundamental concepts of wave propagation in Transmission Lines and Wave Guides

CO5 : Analyze the line parameters and various losses in transmission lines.

CO6 : Apply smith chart for line parameter and impedance calculations

CO7 : Evaluate the characteristics of parallel plane and rectangular wave guides.

B.(11)

Faculty of Hardware & Networking (BVOC)

I Semester: BVOC GEC-1.2T: Basics of Computer Systems

Course outcomes:

CO1: Be familiar with definition of programming and different types programming languages and exhibit the skills to solve problem using algorithm and flow charts.

CO2: Show the ability understand the strengths of C, which provide the means of writing efficient, maintainable, and portable code.

CO3: Be familiar to learn and acquire art of computer programming.

CO4: Exhibit the skills in Programming language for solving a problem.

I Semester: BVOC SDC-1.3: Computer Hardware & Maintenance

Course outcomes:

CO1: Identify the hardware components of a computer. Lists the hardware components such as processor, memory, disk, main board, etc.

CO2: Explains the features (speed, capacity, etc.)of the hardware components of a computer.

CO3: Identify the periferal devices outside computer. Uses computer using input devices, such as keyboard and mouse.

CO4: Connects to the Internet using network cards. Identify the softwares running on a computer.

I Semester: BVOC SDC-1.4T: Operating System

Course Outcomes:

CO1: Analyze the structure of OS and basic architectural components involved in design

CO2: Analyze the various resource management techniques

CO3: Interpret the mechanisms adopted for file sharing

CO4: Conceptualize the components involved in designing a contemporary OS

CO5: Be familiar with various types of operating systems

I Semester: BVOC SDC-1.5T: Basics of Networking

Course Outcomes:

CO1: Be familiar with to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.

CO2: Show the ability to understand the architectural principles of computer networking and compare different approaches to organising networks.

CO3: Be familiar with key networking protocols and their hierarchical relationship in the context of a conceptual model such as the OSI and TCP/IP framework.

CO4: Exhibit the skills of Identify core networking and infrastructure components and the roles they serve.

II Semester: BVOC GEC2.1T: Applied Science

Course outcomes:

CO1: applied science or "technology," aims to use science to solve real-world problems, making it possible

CO2: Applied science are important as they enable science to be more applicable in the real life

CO3: Basics of Dimensions measurements and statistics.

CO4: Properties of solids and liquids along with the elasticity of substances.

CO5: Basics of wave theory and theories of light.

II Semester: BVOC GEC-2.2T: Basics of Electronics and Measuring Instruments.

Course outcomes:

CO1: Identify various types of electronic instrument suitable for specific measurement.

CO2: Classify various errors present in measuring instruments.

CO3: Understand construction, working principle and types of oscilloscopes.

CO4: Comprehend different types of signal generators and analyzers, their construction and operation.

CO5: Describe the working principle, selection criteria and applications of various transducers used in measurement systems.

II Semester: BVOC SDC-2.3T: Hardware Concepts -I

Course outcomes:

CO1: dentify the hardware components of a computer. Lists the hardware components such as processor, memory, disk, main board, etc.

CO2: Explains the features (speed, capacity, etc.)of the hardware components of a computer.

CO3: Identify the peripheral devices outside computer. Uses computer using input devices, such as keyboard and mouse.

CO4: Connects to the Internet using network cards. Identify the software's running on a computer.

II Semester: BVOC SDC-2.4T: Computer Network and Maintenance

Course outcomes:

CO1: Types of Wired and wireless media used for communication between two internet connected devices.

CO2: TCP Connection establishment and Internet protocol.

CO3: Analyze the structure of UNIX OS and basic architectural components involved in design

CO4: Analyze the various UNIX commands for TCP & UDP operation.

CO5: UNIX commands for file operations – file create, file read, file update and file delete.

II Semester: BVOC SDC2.5T: Basics of Windows server 2003

Course outcomes:

CO1: Features of Windows XP Professional, Installing MS Windows XP Professional.

CO2: Users and Groups, Administering Users and Groups, Creating user accounts.

CO3: Configuring user account properties, Implementing security for user accounts

CO4: Different versions of windows and their installations.

CO5: Backup and recovery of data in windows server and disaster recovery management.

III Semester: BVOC GEC3.1: Basics of Communication Skills

Course outcomes:

CO1: Introduction to Communication and its purpose.

CO2: Types of Communication: Verbal & non verbal Communication & its significance in real world.

CO3: Writing Memos, Circulars and Notices.

CO4: Writing E-mail: Principles of E-mail; E-mail Etiquette; Overcoming Problems in E-mail Communication

III Semester: BVOC GEC3.2: Principles Of Digital Electronics

Course outcomes:

CO1: Characteristics of digital ICs, CMOS logic family, Comparison with TTL, Logic Gates and Boolean algebra

CO2: Simplification of logic expressions using Boolean laws and theorems, SOP and POS Expressions, K-map-Simplification

CO3: Arithmetic Circuits: Binary addition and subtraction, Half and Full Adder

CO4: Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) FlipFlops.

III Semester: BVOC SDC3.3: Hardware Concepts -II

Course outcomes:

CO1: Microprocessor History - The First Microprocessor, PC Processor Evolution

CO2: CPU Operating Voltages Math Coprocessors (Floating-Point Units) Processor Bugs structuring

CO3: Working of different processor types - Intel P6 (686) Processors,Pentium Pro Processors, Pentium II Processors, Pentium III, Celeron,Intel Pentium 4 Processors, Pentium 4 Extreme Edition Intel Core Processors

CO4: Processor Modes and Processor Performance as well as cache memory analysis.

III Semester: BVOC SDC3.4: Computer Networking I Through Java Programming

Course outcomes:

CO1: Be familiar with to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.

CO2: Show the ability to understand the architectural principles of computer networking

and compare different approaches to organizing networks.

CO3: Create Java programs that solve simple Networking problems.

CO4: Validate user input, perform a test plan to validate a Java program and Document a Java program.

III Semester: BVOC SDC3.5: MICROPROCESSOR 8085 AND ITS APPLICATIONS

Course outcomes:

CO1: Introduction to microprocessor where students learn about Block diagram of a computer-Function of each block, Hardware, Software, Firmware

CO2: Microprocessor 8085 - Features of 8085, Pin diagram of 8085

CO3: Generation of control signals, clock and reset circuits, Bus drivers-.

CO4: Instruction set architectures and addressing modes.

Semester IV: BVOC GEC-4.1: BASIC ICT SKILLS

Course outcomes:

CO1: Understand basic computer hardware components and terminology

CO2: Proficiency in Using Productivity Software.

CO3: Email, using a common email program (example: MS Outlook, Gmail, Apple Mail),Compose, Send, Reply, Forward messages

CO4: Internet Skills - Set up an Internet connection and connect to the Internet,

CO5: Understand the purpose of Secure File Transfer Protocol (SFTP) and Secure Copy Protocol (SCP).

Semester IV: BVOC GEC4.2: Programming using PYTHON

Course outcomes:

CO1: Be skilled in creating, debugging and testing a software application using the Python programming language.

CO2: Show the ability to study Python Fundamentals to advanced concepts like OOPS.

CO3: Be familiar with Exception handling, multi-threading, Networking.

CO4: Exhibit the skills in Database Connectivity and Graphical User Interface.

CO5: Everything you need to get up and go!

Semester IV: BVOC SDC-4.3: Hardware Concepts –III

Course outcomes:

CO1: Primary Function and Operation of Voltage rails in power supply.
CO2: ATX Design,Additional Power Connectors - Peripheral Power Connectors
CO3: Gain knowledge concerning mobile operating systems and their architecture.
CO4: Recognize and setup a mobile device and application run time environment
CO5: Power system troubleshooting and power system protection.

Semester IV: BVOC SDC4.4: : Computer Networking II through Java Programming

Course outcomes:

CO1: Understand the fundamentals of Java programming language.
CO2: Make your own stand-alone command-line apps or scripts network and web servers.
CO3: Boost your knowledge of transport layer and application layer protocols.
CO4: Implementation of Network protocols using Java Programming.
CO5: Implementation of network security and cryptographic methods.

Semester IV: BVOC SDC4.5: 8051 MICROCONTROLLER AND ITS INTERFACING

Course outcomes:

CO1: Use different types of data structures, operations and algorithms
CO2: Apply searching and sorting operations on files
CO3: Use stack, queue, lists, trees and graphs in problem solving
CO4: Implement all data structures in a high-level language for problem solving.
CO5: Analyze and compare various linear and non-linear data structures
CO6: Code, debug and demonstrate the working nature of different types of datastructures and their applications
CO7: Implement, analyze and evaluate the searching and sorting algorithms
CO8: Choose the appropriate data structure for solving real world problems

Semester V: BVOC GEC-5.1: BUSINESS PROCESS OUTSOURCING (BPO) SKILLS

Course outcomes:

CO1: Learn about ms.net framework developed by Microsoft.
CO2: Be able to using xml in c#.net specifically ado.net and sql server
CO3: Be able to understand use of c# basics, objects and types, inheritance
CO4: Develop, implement and creating applications with c#.
CO5: Develop, implement, and demonstrate component services, threading, remoting, windows services, web

CO6: Understand and be able to explain security in the. Net framework and employment in the net.

Semester V: BVOC GEC 5.2: LINUX System Monitoring and Performance Tuning

Course outcomes:

CO1: Demonstrate the working of basic commands of unix environment including file processing

CO2: Apply regular expression to perform pattern matching using utilities like grep, sed and awk.

CO3: Implement unix commands/ system calls to demonstrate process management

CO4: Demonstrate the usage of different shell commands, variable and awk filtering to the given problem.

CO5: Develop shell scripts for developing the simple applications to the given problem

Semester V: BVOCSDC-5.3 INSTALLING AND CONFIGURING WINDOWS SERVER 2012

Course outcomes:

CO1: Show an ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.

CO2: Exhibit an Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.

CO3: Demonstrate an ability to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamicallygrowing data and in particular scalability issues.

CO4: Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

CO5: Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

CO6: Be able to integrate machine learning libraries and mathematical and statistical toolswith modern technologies like hadoop and mapreduce

Semester V: BVOC SDC-5.4: Certified Ethical Hacking (CEH)

Course outcomes:

CO1: Gain knowledge about ethical hacking and penetration testing.

CO2: Learn about various types of attacks, attackers and security threats and vulnerabilities present in the computer system.

CO3: Examine how social engineering can be done by attacker to gain access of useful&sensitive information about the confidential data
CO4: Learn about cryptography and basics of web application attacks.
CO5: Gain knowledge of the tools, techniques and ethical issues likely to face the domainof ethical hacking and ethical responsibilities

Semester V: BVOC SDC-5.5 Embedded Systems

Course outcomes:

CO1: Understand complexity of machine learning algorithms and their limitations;
CO2: Understand modern notions in data analysis oriented computing
CO3: Be capable of confidently applying common machine learning algorithms in practice and implementing the irown;
CO4: Be capable of performing distributed computations;
CO5: Be capable of performing experiments in machine learning using real-world data.

Semester VI: BVOC GEC-6.1: VLSI Design

Course outcomes:

CO1: Interpret the impact and challenges posed by iot networks leading to new architectural models.
CO2: Compare and contrast the deployment of smart objects and the technologies to connect them to network.
CO3: Appraise the role of iot protocols for efficient network communication.
CO4: Elaborate the need for data analytics and security in iot
CO5: Illustrate different sensor technologies for sensing real world entities and identify theapplications of iot in industry.

Semester VI: BVOC GEC: 6.2 LINUX Enterprise Clustering and Storage Management

Course outcomes:

CO1: Review Red Hat Enterprise Clustering and Storage Management Technologies
CO2: Authentication · Advanced Software RAID
CO3: Cluster Configuration Tools· Clustered Logical Volumes and Lock Management
CO4: Demonstrate the usage of different shell commands, variable and awk filtering to the given problem.
CO5: Hierarchical Resource Ordering & High Availability Services of Global File System

Semester VI: BVOC SDC-6.3: - LINUX Enterprise Deployment and Systems Management Course

Course outcomes:

CO1: Essential System Management · Goals of Enterprise system management

CO2: Managing Changes with Revision Control & Troubleshooting RHN registration.

CO3: Building open source software · Using RPM macros , Writing custom spec files ·

CO4: Configuration file management using command-line tools.

Semester VI: BVOC SDC-6.4: Internet of Things (IOT)

Course outcomes:

CO1: understand the key components that make up an IoT system.

CO2: Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.

CO3: Explain the detailed architecture, define objects, load data, query data and performance tune document-oriented nosql databases

Semester VI: BVOC SDC -6.5: Project & Dissertation

Course Outcomes:

CO1: Have the ability to obtain and use the mathematical, scientific and engineering-based knowledge towards an in-depth technical efficacy in the field of Hardware development.

CO2: Have the ability to identify, conclude and resolve software development related issues.

CO3: Able to design a system, component or process to fulfill the needs in the actual constraints like Networking issues, ethic and cyber security.

CO4: Understand and be determined towards professional responsibility and ethics.

CO5: Have the ability to design and conduct experiments, as well as analyze and translatedata.

CO6: Have the ability to function effectively as individuals and group members, along withthe ability to lead and manage.

CO7: Have the ability to identify and be in possession of lifelong learning capability.

PART – III

POST GRADUATION

3. PG Programme Outcome

Progrmme outcomes of the TWO year Post Graduation Degree Higher Education Programmes identified by the College. Students of all post graduate general degree Programmes at the time of graduation will be empowered towards:

PO1. **Critical Thinking:** Take informed actions after identifying the assumptions that frame their thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at their ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make sense of the world by connecting people, ideas, books, media and technology.

PO3. **Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. **Effective Citizenship**: 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.

PO5. **Ethics:** Recognize different value systems including their own, understand the moral dimensions of their decisions, and accept responsibility for them.

PO6. **Environment and Sustainability**: Understand and exhibit consciousness of the issues of environmental contexts and sustainable development.

PO7. **Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

PO8. **Problem Solving**: Identify, formulate, research literature, and analyze complex Socio-Political, socio-economic, socio-cultural problems reaching substantiated conclusions using first principles of mathematics, natural sciences, management and entrepreneurial skills.

PO9. **Project management and finance:** Demonstrate knowledge and understanding of the finance and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO10. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO11. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO12. **Design/development of solutions:** Design solutions for complex socio-economic problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. PROGRAMME SPECIFIC OUTCOMES

1. Faculty of PG Studies in Chemistry:

Programme Specific Outcomes:

PSO1: Show the ability to plan, design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.

PSO2: Exhibit skills in problem solving, critical thinking and analytical reasoning as appliedto scientific problems.

PSO3: Demonstrate the ability to apply green chemistry techniques in daily life.

PSO4: Be able to appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.

PSO5: Exhibit competency to take up teaching profession, industrial jobs.

PSO6: Show an interest to start small scale industries with the available resources.

PSO7: Develop an aspiration to clear the UGC/NET/KSET and Civil services examinations.

2. Faculty of PG Studies in Organic Chemistry:

Programme Specific Outcomes:

PSO1: Show an ability to design, and carry out synthetic reactions, isolation and purificationof products.

PSO2: Exhibit skills in problem solving, critical thinking and analytical reasoning.

PSO3: Effectively apply gained knowledge in smooth functioning of daily life.

PSO4: Show competency in teaching profession, industrial jobs..

PSO5: Show an ability to start small scale industries with the available resources.

PSO6: Accurately record and analyze the results of synthetic works.

PSO7: Behave ethically in issues that chemists face including an understanding of safe handling of chemicals, and issues like environmental, energy, health and medicine.

PSO8: Successfully clear exams like UPSC, UGC etc.

3. Faculty of PG Studies in Physics:

Programme Specific Outcomes:

PSO1: Become employable acquiring understanding of the subject.
PSO2: Be familiar with good laboratory skills.
PSO3: Appreciate, understand and use the scientific method in the solving of problems.
PSO4: Show the specialized knowledge & skill sets through choice of softcore papers
PSO5: Be readily available manpower for various public and private sector industries.
PSO6: Exhibit familiarity with hands on experience in research and equipment handling.
PSO7: Show an interest to become young physicists to showcase their talents in the field of Physics.
PSO8: Demonstrate the ability to establish start-ups in the field of application of Physics for the progress of the society.

4. Faculty of PG Studies in Environmental Studies:

Programme Specific Outcomes:

PSO1: Understand the basic concepts of Environments and its components along with their interactions through study of Ecology, Biodiversity, Environmental Chemistry, and Environmental Microbiology

PSO2: Understand the different kinds of Pollutions and their sources through study of Climate and Air Pollution Studies, Hazardous Waste & Environmental Toxicology and Soil Pollution and different laws about pollution

PSO3: Analyse and determine pollution using Environmental Analytical Techniques, Biostatistics and Computational Techniques.

PSO4: Understand different technologies like biotechnology, water and Wastewater treatment technology to find the solutions and their applications in abatement of Pollution and other environmental problems.

PSO5: Use of different tools for the management of Environment, Energy resources, solid wastes, Biodiversity conservation like Remote Sensing & Geographical Information Systems and different methodologies.

PSO6: Understand the disaster management and industrial safety.

PSO7: Determine the environmental impact due to different developmental projects and find solution to eliminate these impacts.

PSO8: Through Dissertation, student can identify a particular environmental problem, review the literature for finding the gaps, develop research methodology, collect data and carry out data analysis and interpretation for finding a suitable solution and acquire the ability to write the research findings in the form of structured thesis and communicate the research results through oral or poster presentations

PART-IV
Course Outcome – PG Courses

Faculty of PG Studies in Chemistry (M.Sc.)

Title of the paper: CPT-1.1: Concepts of Inorganic Chemistry

Course Outcomes:

CO1: Understand the structure of ionic and covalent compounds and study of them properties

CO2: Show the knowledge of industrial and commercial applications of halogens, noble gases and non-aqueous solvents

CO3: Demonstrate the understanding of organic precipitants and extraction techniques, masking and de-masking techniques, statistical treatment of errors

CO4: Predict spectral and structural properties of organic and inorganic molecules through symmetry elements and symmetry operation

CO5: Explain the types of bonds and preparatory methods in boranes, inorganic polymers, cage compounds and metal carbonyls

CO6: Analyze the **e**lectronic structure, oxidation states, extractions and separation of lanthanides and actinides.

Title of the paper: CPT-1.2: Organic Reaction Mechanisms and Stereochemistry

Course Outcomes:

CO1: Understand the concept of stereochemistry in various class of compounds

CO2: Know about the optical activity in different class of compounds which are not having any chiral atom

CO3: Understanding Structure and reactivity: Introduction to Acids and Bases, Structural effects on acidity and basicity of organic molecules, hydrogen bonding, resonance, inductive and field effects, hyper conjugation effects, steric effect, Bredt‘s rule.

CO4: Understand the concept of Methods of Determining Reaction Mechanism: Kinetic and non-kinetic methods.

CO5: Students will develop the skills Additions to carbonyl compounds (Aldehyde and Ketones): Addition of water, alcohol, bisulphate, HCN, Grignard reagent and amino compounds.

Title of the paper: CPT-1.3: Thermodynamics and Quantum Chemistry

Course Outcomes:

CO1: Show familiarity of the concept of entropy, laws of Thermodynamics, Chemical potential and fugacity of molecules

CO2: Identify and explain the chain reactions, composite reactions, autocatalytic reactions and reactions in solutions including fast reactions

CO3: know the role of quantum Chemistry in understanding properties of molecules

CO4: Students must have understanding of thermodynamic fundamentals before studying

their application in applied thermodynamics.

CO5: The understanding of thermodynamic properties and processes will assist students in other related coursework.

CO6: Understand and apply quantum chemistry methods, such as the Hartree-Fock method and post-Hartree-Fock methods, to calculate molecular properties and electronic structures.

Title of the paper: SPT-1.4. A: Organic Synthesis

Course Outcomes:

CO1: Exhibit the knowledge about synthetic design, planning of organic synthesis and functionality of groups.

CO2: Illustrate basic principles and techniques used in disconnection approach

CO3: Knowledge of Principles of Green Chemistry and applications of different green techniques in chemical synthesis

CO4: Understand the concept of polymer supports in organic synthesis.

CO5: Understand the concept of multicomponent reactions in organic synthesis.

CO6: Students should become proficient in recognizing and manipulating common functional groups encountered in organic synthesis, such as alcohols, aldehydes, ketones, carboxylic acids, esters, and amines.

Title of the paper: SPT-1.4.B: Automated, Electroanalytical Methods And Separation Technique

Course Outcomes:

CO1: Develop knowledge and skills related to automation in electroanalytical methods.

CO2: Understand how automation enhances the efficiency, accuracy, and reproducibility of electroanalytical measurements.

CO3: understanding of various electroanalytical methods used in chemistry, such as voltammetry, potentiometry, coulometry, and amperometry. Learn about the principles, instrumentation, and applications of these methods in analytical chemistry.

CO4: Learn about automated sample handling, instrument control, data acquisition, and data analysis techniques.

Title of the paper: CPT- 2.1: Group Theory & Coordination Chemistry

Course Outcomes:

CO1: Apply crystal field theory for the study of complexes

CO2: Interpret the spectra and magnetic properties of complexes

CO3: Understand the reaction mechanism in transition metal complexes

CO4: Understand the fundamental concepts of group theory and its applications in chemistry.

CO5: Apply group theory to predict molecular properties such as dipole moments, vibrational

frequencies, and optical activity.

Title of the paper: CPT- 2.2: Reaction Mechanism, Photochemistry and Spectroscopy

Course Outcomes:

CO1: Learn the photochemical reactions, their properties, kinetics and their rearrangement reactions.

CO2: Show the Pericyclic reactions, electrocyclic reactions, cycloaddition reactions andsigma tropic reactions.

CO3: Show the Knowledge of the basics of Microwave and Vibration spectroscopy

CO4: Understand the Electronic spectra of molecules

CO5: Show familiarity with the Nuclear magnetic applications and study of ^{1}H-NMR, ^{13}C-NMR spectra for identification of organic molecules

CO6: Show the knowledge of Atomic Absorption Spectrometry, Emission Spectroscopy, Molecular Luminescence Spectroscopy and Light-Scattering methods for detection of metals, particles and particle size

CO7: Knowledge of mechanism and applications of name reactions which are being used continuously in synthetic chemistry.

CO8: Demonstrate independently the mechanistic treatment of nucleophilic, electrophilic, free radical rearrangements

CO9: Use advanced named reactions in the synthesis of variety of chemical products

Title of the paper: SPT- 2.3.A: Statistical Mechanics, Electrochemistry and Spectroscopy

Course Outcomes:

CO1: Differentiate electrogenic synthesis with conventional synthesis and corrosion types and its control. Role of electro catalysis in hydrogen preparation.

CO2: Be familiar with solar energy conversion to chemical energy and application of batteries, fuel cells

CO3: Understand the Complex reactions, Potential energy surfaces, Theory of kinetic isotope effects and Pharmaco kinetics

CO4: Show the knowledge of Atomic Absorption Spectrometry, Emission Spectroscopy, Molecular Luminescence Spectroscopy and Light-Scattering methods for detection of metals, particles and particle size.

Title of the paper: SPT- 2.3.B: Surface, Nuclear Chemistry and Non-Equilibrium Thermodynamics

Course Outcomes:

CO1: Describe the properties of surfaces and interfaces, including surface tension, adsorption, and catalysis.

CO2: Apply the knowledge of surface chemistry to explain the behavior of colloids, emulsions, and micelles.

CO3: Understand the structure and properties of atomic nuclei, including isotopes, radioisotopes, and nuclear stability.

CO4: Explain the principles and mechanisms of radioactive decay, including alpha, beta, and gamma decay.

CO5: Describe the laws of thermodynamics and their application to non-equilibrium process

CO6: Analyze non-equilibrium systems using concepts such as chemical kinetics, transport phenomena, and reaction rate theory.

Title of the paper: OET – 2.4: Fundamentals of Chemical Analysis & Chromatography

Course Outcomes:

CO1: Apply Chromatographic techniques for separation of components in a reaction mixture

CO2: Know about Structural elucidation of crystals, use XRD and Electron Diffraction techniques

CO3: Apply thermo- analytical methods for identification of samples and radiochemical analysis of samples

CO4: Learn separation techniques, such as chromatography (e.g., liquid chromatography, gas chromatography) and electrophoresis, for the separation and purification of complex mixtures. Understand the principles behind different separation methods and their applications in chemical analysis.

Title of the paper: CPT- 3.1: Reactions, Rearrangements and Heterocyclic chemistry

Course Outcomes:

CO1: Show familiarity with the nomenclature of heterocyclic compounds and knowledge on four membered, five membered and six membered heterocycles

CO2: Learn the mesoionic compounds, anthocyanins, flavones and heterocycles in functional group and ring transformation.

CO3: Show the detailed information on named reactions in heterocyclic chemistry and

their synthetic applications

CO4: Illustrate the basic principles and techniques used in disconnection approach

CO5: Be familiar with mechanistic treatment of nucleophilic, electrophilic free radical rearrangements.

CO6: Understand nomenclature, structure, synthesis and reaction of four and five membered heterocycles.

Title of the paper: CPT- 3.2: Chemical Kinetics and Surface Phenomena

Course Outcomes:

CO1: Students will be able to derive and interpret rate laws for various types of chemical reactions.

CO2: Students will gain knowledge of surface phenomena and the behavior of molecules at interfaces. They will understand concepts such as adsorption, desorption, and surface reactions.

CO3: Study of kinetics by flow techniques, equation for constant time, stopped flow and continuous flow methods. Relaxation method, equation for relaxation time, temperature jump and pressure and pressure jump methods, flash photolysis, pulse radiolysis and shock tube method.

CO4: Students will gain an understanding of colloidal systems, their properties, and the role of surface tension in their stability. They will be able to explain the phenomenon of adsorption at interfaces and its impact on surface tension.

Title of the paper: SPT- 3.3.A: Organometallic Chemistry & Inorganic spectroscopy

Course Outcomes:

CO1: Understand catalysis by organometallic compounds and application of reagents in various chemical reactions

CO2: Explain the Importance of synthetic utility of various organometallic reagents like organolithium organosilicon, tin and boron compounds

CO3: Describe the utilisation of different types of synthetic reagents in variety of chemical reactions.

CO4: Explain the interaction of electromagnetic radiation with inorganic compounds and how it leads to characteristic absorption or emission spectra.

CO5: Understand the basic principles and theory behind various spectroscopic techniques used in inorganic chemistry, including UV-Visible spectroscopy, infrared spectroscopy, nuclear magnetic resonance (NMR), and electron paramagnetic resonance (EPR).

CO6: Interpret and analyze UV-Visible and infrared spectra to determine the electronic and vibrational properties of inorganic compounds.

Title of the paper: SPT- 3.3.B: Industrial and Materials Chemistry

Course Outcomes:

CO1: Gain knowledge on cement, glass, lubricants, paints and pigments.

CO2: Identify the role of catalysts in industrial process, theory and control of corrosion and principles of chemical energy system.

CO3: Classification of polymers and structure property relationship, Strategies in plastic waste management

CO4: Develop an understanding of the chemistry of materials, including polymers, composites, ceramics, and metals. Learn about the synthesis, characterization, properties, and applications of various materials used in industry.

CO5: Acquire knowledge of the principles of chemical reaction engineering and their applications in industrial processes. Understand reaction kinetics, reactor design, mass and energy balances, and process optimization.

CO6: Learn techniques for analyzing and characterizing chemical substances and materials, including spectroscopy, chromatography, microscopy, and thermal analysis. Gain proficiency in interpreting and evaluating analytical data.

Title of the paper: OET – 3.4: Environmental Chemistry

Course Outcomes:

CO1: Show the understanding of air pollution, pollutants and their control and safety measures

CO2: Identify impurities in waste water and their removal

CO3: Identify toxic and solid pollutants in environment and their treatment

CO4: Be aware of air pollution, pollutants and their control and safety measures

CO5: Identify the impurities in waste water and their removal

CO6: Identify toxic and solid pollutants in environment and their treatment

CO7: Be aware of air pollution, pollutants and their control and safety measures

CO8: Identify the impurities in waste water and their removal

CO9: Identify toxic and solid pollutants in environment and their treatment

Title of the paper: CPT- 4.1: Bioinorganic Chemistry and Catalysis

Course Outcomes:

CO1: Understand the role of metal ions in biological systems, energy and enzymes

CO2: Explain the Importance of oxygen carriers, metal storage and nitrogen fixation in biological systems

CO3: Be familiar with Biochemistry of non-metals and Chelation in Medicine.

CO4: They will learn about different coordination geometries, ligand types, and metal-ligand interactions that govern the properties and functions of metalloproteins.

CO5: Students will become familiar with various spectroscopic techniques used in the characterization of metalloproteins and inorganic complexes.

CO6: Students will explore the applications of bioinorganic chemistry in various fields such as medicine, environmental science, and energy. They will learn about metal-based drugs, metalloprobes for imaging,

Title of the paper: CPT- 4.2: Macromolecules, Photochemistry and Solid-State chemistry

Course Outcomes:

CO1: Demonstrate crystal defects and non-stoichiometry, solid state reactions and preparatory methods

CO2: Show the knowledge of electronic properties, Band theory, and magnetic properties of materials

CO3: Knowledge of liquid crystals, superconductivity and organic conducting polymers.

CO4: Understand the techniques and kinetics of polymerization.

CO5: Be aware of stereochemistry, phase transition, solutions and conducting properties of polymers

CO6: Learn photochemical reactions, their properties, kinetics and their rearrangement reactions.

CO7: Students should be able to identify and describe the characteristics of various types of macromolecules, such as proteins, nucleic acids, carbohydrates, and lipids.

CO8: Students should be able to describe and explain the interactions between macromolecules and other molecules or entities, such as ligand-receptor interactions, protein-protein interactions, and enzyme-substrate interactions.

Title of the paper: SPT- 4.3.A: Chemistry of Natural Products

Course Outcomes:

CO1: Learn the structural features of structure, synthesis and stereochemistry of alkaloids

CO2: Show the detailed knowledge of natural product terpenoids, diterpenoids and prostaglandins

CO3: Be aware of chemistry of different steroids and steroidal hormones.

CO4: learn about the structural diversity, biosynthesis, isolation, and characterization of natural products.

CO5: learn about enzymatic reactions, precursor molecules, and the role of various biosynthetic pathways in the formation of specific compounds.

CO6: learn to recognize key functional groups and structural features associated with these compounds.

Title of the paper: SPT -4.3.B: Medicinal Chemistry

Course Outcomes:

CO1: Demonstrate the sound knowledge of antineoplastic agents antimetabolites, cardiovascular agents and antiarrythmic agents and their mode of action

CO2: Be familiar with the antiviral drugs anti-inflammatory drugs, antihypertensive agents and their mode of action

CO3: Articulate the knowledge of industrial pharmacy, different methods of extraction, separation, purification and processes involved in drug delivery system

CO4: Describe the structure activity relation of some important class of drugs

CO5: Explain the Drugs used for various infectious diseases caused by pathogens

CO6: Describe various approaches and designing of drug molecules including prodrug and Combinatorial chemistry

Faculty of PG Studies and Research in Physics (M.Sc.)

Title of the paper: CPT-1.1: Classical Mechanics

Course Outcomes:

CO1: Identify the motion of a mechanical system using Lagrange-Hamilton formalism.
CO2: Apply the formalism of Lagrangian and Hamiltonian in generating equations of motion for complicated mechanical systems of classical mechanics.
CO3: Determine the differential equation of orbit, stability of orbit under central force, scattering cross section, scattering angle, impact factor.
CO4: Compare Lagrangian and Hamiltonian formalism, Galilean and Lorentz transformation and various reference frames.
CO5: Apply theory of relativity to determine time dilation, length contraction and simultaneity,
CO6: Determine the various Four vectors: position, velocity, acceleration, momentum, Force

Title of the paper: CPT-1.2: Mathematical and Computational Physics

Course Outcomes:

CO1: Show advanced learning on how mathematics can be used as an effective tool in solving physical problems.
CO2: Understand and apply mathematical formulation in various branches of Physics.
CO3: Be familiar with programing and how it can be used in solving problems and doing calculations in Physics.
CO4: Exhibit skills in computational and programing application-demanding subjects.

Title of the paper: CPT-1.3: Electronics Circuits, Devices and Communication

Course Outcomes:

CO1: Show an awareness about basic terminologies of radio communication system.
CO2: Be familiar with the different types of modulation techniques used in radio communication system.
CO3: Show an increased learning about radio transmitter and receiver in detail.
CO4: Be familiar with different types of pulse communication system and digital communication system.
CO5: Ability to analyze PN junctions in semiconductor devices under various conditions.
CO6: Ability to design and analyze simple rectifiers and voltage regulators using diodes.
CO7: Ability to describe the behavior of special purpose diodes.

Title of the paper: SPT-1.4.1: Condensed Matter Physics I

Course Outcomes:

CO1: Show an understanding of basic concepts required to understand the nature of bulk materials.
CO2: Be oriented towards a new specified subject.
CO3: Be familiar with the principle and applications of the solid state.
CO4: differentiate between different Lattice types and explain the concepts of reciprocal lattice and crystal diffraction.
CO5: predict electrical and thermal properties of solids and explain their origin.
CO6: explain the concept of energy bands and effect of the same on electrical properties.
CO7: describe the dielectric properties of insulators.

Title of the paper: SPT-1.4.2: Material Science-I

Course Outcomes:

CO1: Understand the conducting, semiconducting, superconducting, dielectric, ferro-telemetric and piezoelectric behavior of materials
CO2: Describe the interactions of light with materials and its effects at the interface.
CO3: Study the effect of composition, structure and temperature on the properties of the materials.
CO4: Differentiate between diamagnetic, paramagnetic, ferromagnetic, ferromagnetic, antiferromagnetic behavior of materials

Title of the paper: CPT- 2.1: Quantum Mechanics I

Course Outcomes:

CO1: Appreciate the paradigm-shift in the laws of microscopic particles.
CO2: Understand the laws of Physics at the level of elementary particles.
CO3: Appreciate the deep and profound ideas that govern the particles at the quantum scale.
CO4: Show an understanding of the nature and properties of various systems from the perspective of quantum mechanical principles.

Title of the paper: CPT- 2.2: Statistical Mechanics

Course Outcomes:

CO1: find the connection between statistics and thermodynamics.
CO2: differentiate between different ensemble theories used to explain the behavior of the systems.
CO3: differentiate between different ensemble theories used to explain the behavior of the Systems and differentiate between classical statistics and quantum statistics.

CO4: explain the statistical behavior of ideal Bose and Fermi systems.

CO5: explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics

CO6: Explain the concepts of path dependence/independence and reversibility/irreversibility of various thermodynamic processes, to represent these in terms of changes in thermodynamic state.

Title of the paper: SPT-2.3.1: Condensed Matter Physics II

Course Outcomes:

CO1: Demonstrate the familiarity with the types of extrinsic semiconductors, theory and mathematical aspects related to extrinsic semiconductors.

CO2: Show an understanding of the formation of pn junction and also junction theory.

CO3: Be skilled in low dimensional semiconductors and their applications.

CO4: Be aware of different semiconductor devices.

CO5: Understand the advanced semiconducting materials.

Title of the paper: SPT-2.3.2: Material Science-II

Course Outcomes:

CO1: Understand the conducting, semiconducting, superconducting, dielectric, ferro-telemetric and piezoelectric behavior of materials

CO2: Materials Science graduates have skills in locating and applying modern tools to resolve the complex engineering problems.

CO3: Understand and suggest the heat treatment process & types. Significance of properties Vs microstructure. Surface hardening & its types. Introduce the concept of hardenability & demonstrate the test used to find hardenability of steels

CO4: Understand concept of mechanical behavior of materials and calculations of same using appropriate equations

Title of the paper: OET– 2.4: Modern Physics

Course Outcomes:

CO1: define the Special and general theories of relativity.

CO2: be knowledgeable about the propositions of relativity and knowledgeable about the concept of time dilation.

CO3: Understanding Quantum Mechanics: Students should gain a solid understanding of the basic principles of quantum mechanics, including wave-particle duality, the uncertainty principle, and the concept of superposition.

CO4: They should be able to apply mathematical formalism, such as wave functions and operators, to describe quantum systems and solve basic problems.

Title of the paper: CPT- 3.1: Quantum Mechanics II

Course Outcomes:

CO1: Appreciate the deep and profound ideas that govern the particles at the quantum scale,
CO2: Understand the nature and properties of various systems from the perspective of quantum mechanical principles,
CO3: Apply their knowledge & understanding of the subject to fathom the working of various devices, instruments and constructs,
CO4: Understand how abstract laws of quantum mechanics help us understand the nature and behavior of matter and its various manifestations.

Title of the paper: CPT- 3.2: Nuclear Physics

Course Outcomes:

CO1: Knowledge of the basic constituents of the nucleus and properties of the nucleus.
CO2: Be familiar with the three processes of radioactive decay & understand the exponential behavior of radioactive samples and know how radioactive dating works.
CO3: Understand the effects of nuclear binding energy and why it leads to nuclear fission and fusion as energy sources. Also know the difference between nuclear fission and nuclear fusion.
CO4: Understand the working principles of the various nuclear detectors and how the nuclear radiations interact with matter.
CO5: Show awareness about the advantages and disadvantages of nuclear radiations.
CO6: Be aware of several practical applications of nuclear physics.

Title of the paper: SPT- 3.3.1: Condensed Matter Physics – III

Course Outcomes:

CO1: Exhibit a working knowledge of concepts in Condensed Matter Physics concepts.
CO2: Show the skills in understanding of experimental techniques of the subject.
CO3: Familiarity with recent advances in the subject.

Title of the paper: SPT- 3.3.2: Material Science-III

Course Outcomes:

CO1: Understanding of advanced materials, including their properties, structures, and synthesis methods. This may include studying topics such as composites, nanomaterials, polymers, and biomaterials.
CO2: Materials Science graduates have skills in locating and applying modern tools to resolve the complex engineering problems.
CO3: Understand and suggest the heat treatment process & types. Significance of properties Vs microstructure. Surface hardening & its types. Introduce the concept of hardenability &

demonstrate the test used to find hardenability of steels

CO4: Understand concept of mechanical behavior of materials and calculations of same using appropriate equations

Title of the paper: OET – 3.4: Nanoscience and Nanotechnology

Course Outcomes:

CO1: Learn a broad foundational knowledge of the Concept of vector and scalar fields. Will be able to contribute to the society in terms of energy via reach out activities to make the process sustainable and more attractive.

CO2: Understand the importance of the Energy and Crystal classes and symmetry and understand the classification nanostructured materials.

CO3: Understand the basics Electronic Nanomaterial Properties and improved the application of Nanotechnology

CO4: Understand the bases for the molecular structure and Nano composites and Will be able to integrate functional materials of various scientific interests into energy engineering for the development of energy conversion and storage technologies.

Title of the paper: CPT- 4.1: Classical Electrodynamics

Course Outcomes:

CO1: Show an ability to solve problems on electricity & magnetism, electrostatics/dynamics.

CO2: Exhibit an understanding of Maxwell's equations and its applications.

CO3: Learn the concepts of metallic waveguide structure and propagation of EM wave through it.

CO4: Students should have a thorough understanding of Maxwell's equations, which describe the fundamental principles of classical electromagnetism. This includes knowledge of Gauss's law, Ampere's law, Faraday's law of electromagnetic induction, and the absence of magnetic monopoles.

CO5: understanding of the nature of electromagnetic waves, including their propagation, polarization, and energy transport. They should be able to derive and analyze wave equations, such as the wave equation for a plane wave in vacuum or a dielectric medium.

Title of the paper: CPT- 4.2: Atomic and Molecular optical Physics

Course Outcomes:

CO1: Understanding of atomic structure, including the electronic configurations, energy levels, and spectroscopic properties of atoms. They will learn about concepts such as electron spin, angular momentum, and quantum numbers.

CO2: Understanding of Molecular Structure including bonding, molecular orbitals, rotational and vibrational motion, and spectroscopic techniques for analyzing molecular properties.

CO3: Understand the structure and constitution of atoms and molecules.
CO4: Understand the basics concepts of Atomic/molecular Physics.
CO5: Analyze the spectra of various atoms.
CO6: Understand the structure and constitution of atoms and molecules.

Title of the paper: SPT- 4.3.1: Condensed Matter Physics – IV

Course Outcomes:

CO1: Show an increased knowledge in research work in crystals& crystal growth,
CO2: Be familiar with the different types of crystal defects and its application in electrical conductivity in battery.
CO3: Show an awareness about special verity of the materials, polymers and their applications.
CO4: Know about Liquid Crystal Displays and their applications.
CO5: Be familiar with the basic structure and working principle of Optical Fiber Cable.
CO6: Know about different types of optical sources and optical detectors.
CO7: Be familiar with the basic power budget designing techniques used in OFC communication system.

Title of the paper: SPT -4.3.2: Material Science-IV

Course Outcomes:

CO1: Explore materials used in energy generation, storage, and conversion. Study the properties and applications of materials in areas such as solar cells, batteries, fuel cells, and thermoelectric devices.
CO2: Learn about different techniques for processing and manufacturing materials, including casting, powder metallurgy, sintering, and thin film deposition. Understand the relationship between processing parameters and material properties.
CO3: Learn advanced techniques for characterizing materials at the atomic, molecular, and microstructural levels. Develop skills in using various analytical tools such as electron microscopy, X-ray diffraction, spectroscopy, and thermal analysis.
CO4: Explore the optical properties of materials, including absorption, reflection, transmission, and emission of light. Understand the principles of photonic materials and their applications in areas such as telecommunications and photonics.

Faculty of PG Studies in Environmental Science (M.Sc.)

Title of the paper: CPT-1.1:Environmental Biology

Course Outcomes:

CO1: Understand Principle and scope of environmental biology: Basics of environmental biology and concepts of ecosystem. Classification of ecosystem: fresh water, marine, estuarine and terrestrial ecosystems.

CO2: Biogeochemical cycles: carbon cycle, oxygen cycle, nitrogen cycle, sulfur cycle, phosphorus cycle-it's importance and applications.

CO3: Apply skills with Classification of biomes, major biotic elements of each biome and their characteristics. Community ecology, predator and prey relationship.

CO4: Forest ecology and threats to ecosystem Basics of different types of forest ecosystem, forest influence on climate regulations, forest as a carbon sink

Title of the paper: CPT 1.2 ENVIRONMENTAL CHEMISTRY

Course Outcomes:

CO1: Explain the Fundamentals of Environmental Chemistry: Definition of various terms: molarity, molality, normality, percent of stock and standard solution preparation. Stoichiometry, gibbs energy.

CO2: Understanding the concept Chemistry of elements: Ions and radicals, thermo and photochemical reactions, physical and chemical properties of water, concept of oxygen demand: BOD, COD, pH Conductivity

CO3: Demonstrate the knowledge Environmental Instrumentation: Spectrometry, UV-Vis and IR spectrophotometer and AAS, flame spectrometry and fluorimetry; Chromatographic techniques: Paper, Thin Layer

CO5: Ability to analyze Pollutant chemistry: Chemistry of various organic and hydrocarbon decay, environmental effects of surfactants, pesticides and heavy metals on micro and macro-organisms

CO6: Suggest remedial measures of preservation of food through various methods.

Title of the paper: CPT 1.3 :ENVIRONMENTAL GEOSCIENCES

Course Outcomes:

CO1: Trace and relate the evolution of cells.

CO2: l e a r n a b o u t Basics of Geosciences: Principles, Scope and its importance, bio-geographical classification zones, origin of the earth, earth systems and its interaction, structure and composition of lithosphere, atmosphere, hydrosphere and biosphere

CO3: Understanding Earth's climate: Climatic classification and variability, movements in atmosphere, global scale, ocean circulation pattern, El-nino and southern oscillation, La-nina, glacial cycles

CO4: Learn about Water Resources and management: Introduction, types of water resources, hydrological cycle, Global water Distribution and balance

Title of the paper: SPT 1.4 A - ENERGY AND ENVIRONMENT

Course Outcomes:

CO1: Explain the Introduction to Energy: Work and power; energy sources, resource and reserves, an overview of the current global and national energy scenario

CO2: Show the Renewable and alternative energy sources: Solar energy and insulation, active and passive solar systems, photovoltaic cells, hydropower, tidal power, wind power, geothermal energy, ocean energy, fuel cells, environmental consequences of renewable energy.

CO3: Understand the Energy storage and distribution: Distribution of energy, energy storage- heat storage; mechanical storage and types of carbon sequestration.

CO4: Learn about the Bio-energy: Biomass as energy source; energy farming, biomass types and their characteristics, biomass production, biomass conversion.

Title of the paper: SPT 1.4 B - NATURAL RESOURCES

Course Outcomes:

CO1: Demonstrate the knowledge of the working principle, instrumentation, and applications of an age-old technique, chromatography and also show how this traditional method has been modernized into the present day HPLC, UPLC etc

CO2: Analyze the working principle, instrumentation and applications of technique of electrophoresis.

CO3: Apply the Principles: Classification, concepts and approaches of natural resource classification and conservation. Land resources, plant, animal and microbial resources.

CO4: Show the familiarity of the Water Resources: Concept and classification, integrated water resource management (IWRM), participatory watershed development in water harvesting, lakes and river conservation programmes.

CO5: Forest management: forest land use pattern in India, future demand of forestlands.

Title of the paper: CPT- 2.1: Environmental Pollution, Monitoring and Control

Course Outcomes:

CO1: Show the understanding of the Air pollution: Definition, sources and classification of air pollutants, transport and diffusion of pollutants, effect of air pollution on man and climate.

CO2 : Explain the role of different type Aquatic and Soil Pollution: Introduction, methods of sampling, water quality standards, inorganic & organic pollutants in the aquatic environment

CO3 : Analyze the Radioactive Pollution: Definition, radioactivity, radionuclides, radiation emissions, sources, radioactive decay and buildup

CO4 : Biological effects of radiation, radiation exposure standards, pollution control measures and biological dosimetry.

Title of the paper: CPT 2.2: SOLID WASTE MANAGEMENT

Course Outcomes:

CO1: Understanding the Hazardous wastes: Definition, sources and characteristics, hazardous waste categorization,

CO2: Show familiarity with the lobal Scenario of Solid Waste Management: Definition, types, sources, characteristics. Waste generation rates, concepts of waste reduction, recycling and reuse, collection, segregation

CO3: Understand the Effects of e-waste and biomedical waste control measures..

CO4: Show the familiarity with the Solid waste processing technologies: Mechanical and thermal volume reduction. Biological and chemical techniques for energy and other resource recovery.

CO5: Demonstrate the understanding of the Biomedical and Electronic Waste Management: Sources, characterization, types, impact of biomedical and electronic waste on environment, global scenario for biomedical and e-waste management. Effects of e-waste and biomedical waste control measures.

CO6: Disposal in landfills: site selection, design, and operation of sanitary landfills, secure landfills and landfill bioreactors, leachate and landfill gas management

Title of the paper: SPT 2.3A - ENVIRONMENT AND CONSERVATION

Course Outcomes:

CO1: R Magnitude of biodiversity: Levels of Biodiversity: Genetic diversity, species diversity (alpha, beta and gamma biodiversity, point diversity).

CO2: Learn about the Ecosystems diversity: Biomes, mangroves, coral reefs, wetlands and terrestrial diversity. Species diversity: richness and evenness, loss of species, magnitude of biodiversity.

CO4: Understand how the Threats to Biodiversity: Habitat loss and fragmentation, disturbance and pollution, introduction of exotic species, extinction of species. IUCN categorized-endangered, threatened, vulnerable, species, Red data book and related documentation.

CO5: Methods of conservation: In-situ: Biosphere reserves, National Parks, Sanctuaries, Sacred groves etc).Protection area network, Biosphere region and ex-situ: Botanical gardens, Zoological gardens.

Title of the paper: SPT 2.3 B - ENVIRONMENTAL TOXICOLOGY

Course Outcomes:

CO1: Show the familiarity of the Basics of Toxicology: Definition and scope, Toxic chemicals in the environment and biochemical aspects of As, Cd, Pb, Hg, CO, O3, PAN, pesticides and carcinogens in air, water and soil.

CO2: Explain the Toxicity testing: Bioassay: Definition, purpose, criteria for selection of

test organism, methodologies.

CO3: Understanding the Bio-transformation, bio-accumulation and bio-magnification: Principles, receptor sites absorption and storage of xenobiotics, types of bio-transformations, toxico-genomics and pharmacogenomics

Title of the paper: CPT 3.1: ENVIRONMENTAL SYSTEMS ANALYSIS, REMOTE SENSING AND GIS

Course Outcomes:

CO1: Understand the basic Role of mathematical models in environmental quality management. D

CO2: GIS Platforms and other technologies: Basic components of GIS, geographic information system and spatial data types, GIS design analysis and organization

CO3: Understand the Fundamentals of Remote sensing: Remote Sensing: history & development, definition, concept and principles, energy resources, radiation principles, electromagnetic radiation, interaction between matter and electromagnetic radiation

CO4: Knowledge to acquire the patent and copyright for their innovative works.

CO5: Learn the Applications of Remote sensing and GIS: GIS uses for environmental monitoring. GIS and spatial distribution of environmental data, data integration and analysis, data-based structure, satellite data analysis, GIS software

Title of the paper: CPT 3.2: WATER AND WASTEWATER MANAGEMENT

Course Outcomes:

CO1: Demonstrate the Global distribution of water: Sources of water and its characteristics, physical and chemical properties of water, distribution and supply, global, national and regional levels.

CO2: Apply the techniques Water purification Screening: Coarse screen, medium screen, fine screen. Treatment system: sedimentation and coagulation.

CO3: Describe the Fertility restoration by means of *In vitro* fertilization and embryo transfer technology.

CO4: Understand Ground water hydrology Occurrence of groundwater, ground water zones, porosity, permeability and types of aquifers, water table, changes in water quality and saltwater intrusion.

CO5: Describe commercial production of various biomolecules, Bt crops, mining etc.

Title of the paper: SPT 3.3 A - ENVIRONMENTAL MICROBIOLOGY

Course Outcomes:

CO1: Understanding the History and Scope of Microbiology Ultra structure of prokaryotes and eukaryotes cell, general characters of a) Protozoa b) algae c) fungi d) bacteria e) virus, sterilization techniques

CO2: Learn about the Microbial Ecology: Distribution of microorganisms in air, water and soil, factors influencing the growth of micro-flora in various habitats, adaptation of microorganisms to extreme environment

CO3: Applied Environmental Microbiology Air and water borne diseases, bio-aerosols, environmental control measures. Microbial biodegradation of ores, Xenobiotic compounds and biomass.

CO4: Compare the various methods and apply them in different fields

Title of the paper: SPT 3.3 B - ENVIRONMENTAL IMPACT ASSESMENT, POLICY AND LAWS

Course Outcomes:

CO1: Introduction to the Basic concept and principles of EIA, origin and development of EIA, short term and long-term objectives of EIA, EIA 2006 Notification (GOI).

CO2: Environmental Audit General approaches to environmental auditing, audit methods, benefits of environmental auditing

CO3: Environmental Planning and Monitoring Guidelines and policies, document planning and Environmental documentation, environmental monitoring.

CO3: Legal control of Environmental pollution in India: Historical background of Laws in India, constitutional mandate for Environmental Protection.

Title of the paper: CPT 4.1 ENVIRONMENTAL DISASTER MANAGEMENT

Course Outcomes:

CO1: Disaster: Introduction, classification of major disaster, Geological Hazards: Earthquakes, Volcanoes, Tsunami. Hydrological hazards: Floods, droughts, water quality, contamination, cyclones and hurricanes, typhoon, cloud burst.

CO2: Disasters and Hazard Management: Human and ecological impacts, risk assessment and vulnerability analysis, national preparedness and adaptation strategies, Disaster Management act 2005, National policy on disaster management 2009 and role of NDMA

CO3: Apply Disaster Management Cycle: Importance and Scope of Disaster Management. nature of natural disasters, their types and effects, Effect of El Nino and La Nino phenomenon on global climate

CO4: Role of GIS and remote sensing in surveillance, monitoring, risk assessment, estimation of losses and planning Role of Information, Education, Communication, and Training in Disaster Management. R

CO5: Prediction of natural disasters: Precaution and disaster management, modeling of disaster and Hazards

Title of the paper: CPT 4.2: ENVIRONMENTAL RESEARCH METHODOLOGY, STATISTICS AND COMPUTER APPLICATIONS

Course Outcomes:

CO1: Measures of dispersion: relative measures, range, standard deviation, variance, quartile deviation, co-efficient of variability Probability.

CO2: Explain Introduction: Sampling, data collection and recording. Central tendency: concept, arithmetic mean, mode, median for ungrouped data

CO3: Apply the Statistical Methods: Hypothesis testing, significance and correlation. Correlation: linear models and regressions. Pearson and other correlation coefficients

CO4: Research Writing: Overall outline and structure of the article/manuscript. Description, value, and development of points/outlines before writing. Screening of Material for inclusion within the structure of the manuscript.

CO5: computer applications: Computer fundamentals, operating system, database management system, hardware and software concept, basics of HTML and internet, Application of computer in understanding environmental processes and management

Title of the paper: SPT 4.3 A - ENVIRONMENTAL EDUCATION AND AWARENESS

Course Outcomes:

CO1: Introduction to environmental education: Need for the public awareness for environmental protection through print, electronic and social media.

Co2: Analyze different types of vitamins, organic acids, antibiotics, hormones and other commercially important compounds and their production methods.

Co3: Apply the skills of commercial production of microbial enzymes, their purification methods, and their proper applications in different fields.

CO4: Explain Social Perspectives on Environment: Global and Indian issues, value education, people participation in resource conservation, environmental protection and sustainable development. Role of individual for protection of environment.

CO5: Understanding Definition and concepts of sustainable development: Integration of economic, social and environmental sustainability, biodiversity and availability of natural resources in development.

Title of the paper: SPT 4.3 B - ENVIRONMENTAL BIOTECHNOLOGY

Course Outcomes:

CO1: Understand the Introduction to Environmental Biotechnology: Brief account on restriction enzymes, cloning vectors

CO2: Applications: Microbial process involvement, vermin-composting, bio-fertilizer, bio-pesticide production

CO3: Show the knowledge Environmental Genomics: Metagenomics and metaproteomic, Eco genomics or community genomics, study of genetic material recovered directly from environmental samples.

CO4: Experiment with the existing software tools effectively to extract information from large databases and to use this information in computer modelling.

CO5: Demonstrate the Bioremediation: Concept, role of bioremediation in controlling various pollution problems e.g. solid waste, sewage water

Title of the paper: OEPT 2.4: GLOBAL ENVIRONMENTAL ISSUES AND HUMAN HEALTH

Course Outcomes:

CO1: Analyze the fermentation technology , requirements to fermentation with respect to media composition, strains developments , different screening methods to isolate the desired micro-organisms, media for commercial fermentation .

CO2: Pollution-I: Air and Water pollution: Air pollution: Definition, sources and classification of air pollutants.

CO3: Contemporary and emerging environmental issues of local, regional and global significance:

CO4: Pollution-II: Noise and Soil: Noise Pollution: Definition, sources and terminology, types of noise, measurement of noise, noise indices, noise exposure level and impact on human beings and climate.

Title of the paper: OEPT 3.4: CLIMATE CHANGE

Course Outcomes:

CO1: Understand the Climate change Causes and consequences of Global warming, greenhouse effect, global and regional trends in greenhouse gas emissions, sea level rise, role of oceans and forests as carbon sinks, ozone depletion- stratospheric ozone shield and Ozone hole.

CO2: Key scientific facts on climate change: Impact of climate change on biodiversity, spread of diseases, food production, natural resources and human health, global mitigation strategies for climate change.

CO3: Demonstrate the understanding of the Tools for mitigating global warming and climate change impacts: International agreements and protocols. The role of UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation (REDD) and REDD+ and Clean Development Mechanism (CDM)

CO4: Climate Solutions: Adaptation, mitigation with renewable energy technologies, green building, energy efficiency and reducing consumption, the Smart Grid, clean coal technology, Kyoto protocol, clean development mechanism, COP series and other laws.