**B.Sc. (PMCs)**

**Program Outcomes (POs)**

| Program Outcome | Description |
|---|---|
| **PO1** | Propose novel ideas towards solutions to contemporary problems justifying with relevant facts and data |
| **PO2** | Develop scientific outlook and see the relevance of science concepts in all aspects of life |
| **PO3** | Identify, formulate and analyze complex Scientific problems using principles of natural and applied sciences. |
| **PO4** | Comprehend concepts, frameworks and inventions through various learning methods and effectively communicate them to others orally and in writing. |
| **PO5** | Analyze critically the given scientific data ascribe meaning to them and draw objective conclusions. |
| **PO6** | Demonstrate empathetic social concern, skills to effectively participate in civic affairs and democratic decision making. |
| **PO7** | Imbibe ethical, moral and social values to become cultured and civilized global citizens. |
| **PO8** | Apply concepts of sustainable development to make a difference in social and environmental issues. |
| **PO9** | Develop multidimensional skills and habits as lifelong learners. |

**Program Specific Outcomes (PSOs)**

| Program Specific Outcome | Description |
| --- | --- |
| **PSO1** | Ability to explain core theoretical concepts/ their scientific basis and applications relevant to the disciplines of Physics, Mathematics and Computer Science at foundation level |
| **PSO2** | Demonstrating qualitative/quantitative reasoning skills and ability to use tools/methods relevant to the disciplines of study |
| **PSO3** | Understand the impact of science on society and engage in life-long learning and professional development |
| **PSO4** | Demonstrate awareness of national and global trends in the fields covered by the study and assessing their implications |

**Course Outcomes**

**2019-20 Batch**

**I SEMESTER**

| Sem | Subject Code | Subject | Course Outcomes |
|-----|-------------|---------|-----------------|
| 1 | 19PHY1C03 | PHYSICS-I (Mechanics and Properties of Matter) | **CO1**:Understanding of  basic facts, principles and physical laws<br>**CO2**: Analyze applications of vectors and differential equations, concept of laws of conservation and apply them to basic problems.<br>**CO3**:Exhibit analytical reasoning and logical ability in problem solving related to gravitation, rigid bodies, elasticity and fluid dynamics.<br>**CO4**:Demonstrate  basic experimental  skills in rigid bodies, elasticity and fluid dynamics |
| 1 | 20MATH1C21 | Mathematics-I | **CO1**:Recall basic concepts of Matrices and AG 3D<br>**CO2**:Explain concepts like Echelon form, normal form, rank, diagonalization of matrices. Intrepret geometrical properties of lines and planes<br>**CO3**:Calculating the rank of a matrix and examine the nature of geometrical properties<br>**CO4**:Analyze the nature of solution and categorize the the nature of geometry of lines and planes<br>**CO5**:Evaluation of eigen values and eigen vectors of a matrices. Measure distances between planes and lines<br>**CO6**:Design the proofs about Cayley Hamilton theorem and related results. Derive various forms of planes and straight lines. |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 1 | 20MATH1C22 | Mathematics-II | **CO1**:Recall basic rules of counting and basic formulae of differential calculus<br>**CO2**:Explain the concepts of selection and arrangements. Describe the concepts of successive differentiation<br>**CO3**:Apply techniques of combinatorics in real life situations. Demonstrate the validity of Leibnitz and Euler's theorems<br>**CO4**:Illustrate the use of conditional probabilities and Baye's theorem. Analyze the properties of homogeneous functions.<br>**CO5**:Measure the probabilities compound events. Evaluation of partial derivatives and Jacobians of composite functions<br>**CO6**:Develop methodology to solve decision problems in combinatorics. Derive formulae for total derivatives of multivariable functions |
| 1 | 16CS1C05 | COMPUTER SCIENCE I DIGITAL FUNDAMENTALS AND OBJECT ORIENTED PROGRAMMING USING C++ | **CO1**: Describe the operation of logic gates; apply the laws of Boolean algebra to simplify Boolean expressions.<br>**CO2**: Design combinational and sequential circuits using logic gates<br>**CO3**: Distinguish between Structured and Object-Oriented problem solving approaches and apply them based on the problem given<br>**CO4**: Identify classes and objects from the given problem description and able to create classes and objects using C++<br>**CO5**: Discuss and demonstrate operator overloading<br>**CO6**: Achieve code reusability and extensibility by means of Inheritance and Polymorphism. |
| 1 | 16ENG1L02 | English-I | **CO1**: Demonstrate a coherent and systematic knowledge of the field of English literature showing an understanding of current theoretical and literary developments in relation to the specific field of English studies.<br>**CO2** : Demonstrate a set of basic skills in literary communication and explication of literary practices and process with clarity. |
| 1 | 16AENG1L01 | Additional English-I | **CO1**: Understand representative literary and cultural texts within historical, geographical, and cultural contexts.<br>**CO2**: Apply critical and theoretical approaches to the reading and analysis of literary and cultural texts in multiple genres. |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 1 | 16KAN1L01 | Kannada-I | **CO1** : To understand ancient Kannada literature form and principles of life as depicted in it.<br>**CO2** : Develop creative thinking with the introduction of different literature forms.<br>**CO3** : Awareness about gender equality and social harmony.<br>**CO4** : Develop business correspondence skills through letter writing.<br>**CO5** : Ability to formulate a value based thought process with inclusive approach. |
| 1 | 16SAN1L01 | Sanskrit-I | **CO1**: Student will be able to understand Nitishatakam and Viduraniti as political Science<br>**CO2**: Develop administrative skills.<br>**CO3** : Analyze five principles of Panchatantra for proper examination.<br>**CO4**: Evaluate the information and defend the right cause.<br>**CO5**: Ability to formulate the value based thought process with inclusive approach. |
| 1 | 16PHY1C3L | PHYSICS LAB-I | **CO1**: Understand the working principles of instruments used in experiment<br>**CO2**:Acquire the experimental skills in concepts like fluid dynamics, oscillations, conservation of energy and rigid bodies<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |
| 1 | 16CS1C5L | COMPUTER SCIENCE LAB 1 | **CO1**: Explain the usage of selection statements and iteration statements and write simple programs.<br>**CO2**: Discuss the usage of data structures like arrays and structures.<br>**CO3**: Explain the concepts of inline functions, function overloading and default arguments and use them according to the user requirements.<br>**CO4**: Create solutions to a range of problems using the classes and objects, constructors.<br>**CO5**: Discuss and demonstrate operator overloading<br>**CO6**: Achieve code reusability and extensibility by means of Inheritance and Polymorphism. |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 2 | 16PHY2C03 | PHYSICS-II (THERMAL AND STATISTICAL PHYSICS AND ACOUSTICS) | **CO1**:Equipped with the basic facets of thermodynamics, statistical distribution laws and acoustics of sound along with their applications<br>**CO2**: Ability to analyze the statistical nature of physical systems from an energy perspective<br>**CO3**:Understand, identify and differentiate between the concepts of statistics and the statistical distribution laws of particles<br>**CO4**:Demonstrate laboratory skills pertaining to Sound and Thermal Physics |
| 2 | 20MATH2C21 | Mathematics-III | **CO1**:Students will recall the basic derivatives and integrals of basic functions and fundamental knowledge about the concepts of Numerical methods<br>**CO2**: Students will interpret the meaning and concepts of Differential calculus, integral calculus and Numerical methods.<br>**CO3**:Students will learn to solve problems on Differential calculus, integral calculus and Numerical methods.<br>**CO4**:Students will learn to analyze various methods of calculus and its calculation<br>**CO5**:Students will gather knowledge of deriving various formulae of calculus and numerical algorithms |
| 2 | 20MATH2C22 | Mathematics-IV | **CO1**:Students will identify the basic concepts of group theory, graph theory and basic knowledge about geometry of planar curves<br>**CO2**:Students will be able to associate the concepts involving group theory and graph theory. They also learn to interpret definite integrals and its properties<br>**CO3**:Students will gain knowledge to illustrate the examples and constructions involving group theory, graph theory and planar curves<br>**CO4**: Students will learn to categorize the set of all kinds of groups, finite, infinite, isomorphic graphs and analyze area and volume bounded by the planar curves<br>**CO5**: Students will gain the knowledge to assess and evaluate the effect of mappings and compute various invariants of graphs<br>**CO6**:Students will develop skills to compute various subgroups, application of graph theory techniques in network algorithms and methods concerning surface area and volumes of solids of revolution |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 2 | 16CS2C05 | COMPUTER SCIENCE II DATA STRUCTURES | **CO1**: Explain the organization and operations of different data structures like Stack, Queues, linked lists, Trees, and Graphs.<br>**CO2**: Compare and contrast the functionalities and applications of different data structures<br>**CO3**: Implement data structures efficiently in C++<br>**CO4**: Demonstrate specific search and sort algorithms using data structures given specific user requirements.<br>**CO5** :Analyze and compare the complexity of searching and sorting algorithms. |
| 2 | 16ENG2L02 | English-II | **CO1** : Display knowledge to cultivate a better understanding of values – both literary values that aid us in literary judgment and also values of life at all stages.<br>**CO2** : Cultivate ability to look at and evaluate literary texts as a field of study and as part of the wider network of local and global culture. |
| 2 | 16AENG2L01 | Additional English-II | **CO1**: Recognize and describe the critical approach, ideas, values, and themes contained in the literary writings that affect our culture and society.<br>**CO2**: Write analytically in a variety of formats, including essays, speeches, and reflective writings. |
| 2 | 16KAN2L01 | Kannada-II | **CO1**: Students will be able to understand the importance of democracy, elections and responsibility of the younger generation.<br>**CO2** Awareness about student life, knowledge acquisition through academics and learning beyond for holistic development.<br>**CO3** Analyze and differentiate the cultural beliefs to give up superstitious beliefs.<br>**CO4** Evaluate the information based on social concerns and defend the right cause. |

| Sem | Subject Code | Subject | Course Outcomes |
|-----|-------------|---------|-----------------|
| 2 | 16SAN2L01 | Sanskrit-II | **CO1** : Student will be able to understand the importance of the ancient knowledge system<br>**CO2** : Develop creative thinking.<br>**CO3** : Analyze the situation on time and gravity which in turn will help in decision making.<br>**CO4** : 'Evaluate the self' – introspection in day to day life, personality development and thereby contribute for a better harmonious society. |
| 2 | 16PHY2C3L | PHYSICS LAB-II | **CO1**:Understand the working principles of instruments used in experiment<br>**CO2**: Acquire the experimental skills in concepts like heat, radiation, elasticity sound and shock waves<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |
| 2 | 16CS2C5L | COMPUTER SCIENCE LAB II | **CO1**: To implement algorithms for different Data structures efficiently.<br>**CO2**: Design and implement programs for Stacks, Queues and linked list.<br>**CO3**: Design and implement programs for a given Search problem (Linear Search and Binary Search)<br>**CO4**: Create and Implement the programs for Binary search Traversals(Inorder,Preorder and PostOrder traversals)<br>**CO5**: Design and implement algorithms for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, and Merge Sort and compare their performance in term of Space and Time complexity |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 3 | 16PHY3C01 | PHYSICS-III (OPTICS, ELECTRICITY AND MAGNETISM) | **CO1**:Ability to identify and apply the principles of wave s so as to understand the physics behind various optical phenomenon<br>**CO2**: Equipped with the knowledge of working with optical instruments like polarimeter, interferometer, and diffraction grating<br>**CO3**:Understanding of various Electrostatics and Magnetostatics laws and its applications<br>**CO4**:Identify, analyze and differentiate electrical networks using various analysis techniques<br>**CO5**:Demonstrate knowledge and understanding of the Maxwell's equations and its applications<br>**CO6**: Assessing and interpreting laboratory experiments pertaining to Optics, Electricity and Magnetism |
| 3 | 16MATH3C41 | Mathematics-V | **CO1**:Understand the concept of group structure, subgroups, order elements of a group and methods of proving various facts about finite and infinite groups.<br>**CO2**:Know the concept of cyclic group and its generators and also the computations involving subgroup of finite groups through Lagrange's theorem.<br>Gain an understanding various kinds of groups and in particular about finite groups.<br>**CO3**:Analyse certain applications of integration and gain an understanding of fundamental principles of computing length of a curve between two given points, surface area of surfaces of revolution.<br>**CO4**: Learning certain techniques concerning volumes of solids of revolution and also techniques for planar and non-planar graphs.<br>**CO5**:Research into techniques of graphs theory using rings and vector spaces, understand vector space and matrix representation concerning graphs.<br>Gain the knowledge of applying matrix techniques to networks. |

| Sem | Subject Code | Subject | Course Outcomes |
|-----|-------------|---------|-----------------|
| 3 | 16MATH3C42 | Mathematics-VI | **CO1**:Know various techniques to solve differential equations through numerical and computer methods and understanding of schemes like Taylor's method, Euler's method and Runge-Kutta method.<br>**CO2**:Research into techniques solving first order ordinary differential equations and knowledge pertaining to various types like variable separable type ODE's, homogeneous differential equations Bernoulli equations and equations reducible to homogenous forms.<br>**CO3**:Demonstrate techniques to solve linear and non linear ODE's and understand the geometric views of solutions and also orthogonal trajectories to be traced in cartesian and polar forms.<br>**CO4**:Illustrate the concept of infinite sequences of real numbers, convergence of sequences and gain the skills to prove the nature of convergence of various types of sequences.<br>**CO5**:Analyze techniques proving monotonicity of certain sequences and relate the knowledge of techniques to find nature of standard sequences. |
| 3 | 16CS3C03 | COMPUTER SCIENCE III-JAVA PROGRAMMING | **CO1**: Describe the object-oriented Programming principles and explain the concepts of classes, functions, data and objects.<br>**CO2**: Identify the different types of inheritance and demonstrate code reuse using inheritance<br>**CO3**: Explain the concepts of packages, interfaces and access specifiers.<br>**CO4**: Use exceptions, threads in a given program.<br>**CO5**: Explain the concept of applets, and Input/output streams |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 3 | 16CENG0A1 | Communicative English | **CO1**: To enhance the understanding of LSRW skills and various approaches to language.<br>**CO2**: Providing an in-depth academic exposure about various forms of communication to enable students to be better speakers and users of language.<br>**CO3**:Demonstrate a coherent and systematic knowledge of the field of communication through understanding of current linguistic and literary developments .<br>**CO4**: Demonstrate a set of basic skills in literary communication and explication of literary practices and process with clarity.<br>**CO5**: Write analytically in a variety of formats, including essays, speeches, and reflective writings. |
| 3 | 16PHY3C1L | PHYSICS LAB-III | **CO1**:Understand the working principles of instruments used in experiment<br>**CO2**: Acquire the experimental skills in concepts like Optics, Electricity and Magnetism<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |
| 3 | 16CS3C3L | COMPUTER SCIENCE III - LAB | **CO1**:Explain the usage of selection statements and iteration statements and use the correct programming construct according to the situation in their code.<br>**CO2**:Identify the different types of inheritance supported in Java and develop complex programs appropriately reusing previously created classes.<br>**CO3**: Describe and use packages and appropriately use access specifiers, exception handling keywords, exception handling classes, and handle exceptions in programs.<br>**CO4**: Describe the purpose of multithreading and write programs using threads to improve performance of code.<br>**CO5**: Explain the methods defined in Applet class and the life cycle of applet, and write programs to perform input/output operations on file |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 4 | 16PHY4C01 | PHYSICS-IV (ELEMENTS OF MODERN PHYSICS) | **CO1**:Interpretation of the inadequacies of classical mechanics and understanding of the historical development of quantum mechanics and ability to discuss and interpret experiments that reveal the dual nature of matter.<br>**CO2**: Comprehending the central concepts of quantum mechanics and ability to identify and differentiate between wave functions, momentum and energy operator and the time dependent and independent Schrodinger equations.<br>**CO3**:Apply problem solving skills to one dimensional rigid box, tunneling through potential barrier, step potential, rectangular barrier<br>**CO4**:Understanding the basics of Crystallography<br>**CO5**:Ascertain the quantitative foundations of Atomic and Nuclear Physics<br>**CO6**: Equipped with experimental foundations in Atomic physics, Nuclear physics and X-ray diffraction analysis |
| 4 | 16MATH4C21 | Mathematics-VII | **CO1**:Students will recall the concept of series of real numbers, group theory and periodic functions<br>**CO2**:Students will be able to explain the nature of series, groups and Laplace transforms of various functions<br>**CO3**:Students will gain the knowledge of illustrating the nature of series, proof techniques in group theory and solve problems using Laplace transforms<br>**CO4**: Students will get the skills to classify groups, different infinite series and functions<br>**CO5**:Students will learn to evaluate the sum of infinite series, kernels of mappings and differential equations using Laplace transforms<br>**CO6**:Students will learn the skills to research on properties of standard series to understand the tests of convergence, key results of group theory and techniques of Laplace transforms |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 4 | 16MATH4C22 | Mathematics-VIII | **CO1**:Students will learn to identify periodic functions, techniques to solve linear higher order ordinary differential equations and the meaning of differential coefficients<br>**CO2**:Students will understand the basics of Fourier series and problems involving Half range series of sines and cosines, knowledge of writing complementary functions and particular integrals for second order ordinary differential equations and gain skills in finding certain critical points for one variable real valued functions<br>**CO3**:Students will gain knowledge to solve various problems involving Fourier expansions, solving various problems on the theme of ODE's and problems involving mean value theorems<br>**CO4**:Students will learn to illustrate the behaviour of periodic functions with different periods and one variable functions using series expansion<br>**CO5**:Students will be able to evaluate the solutions for problems involving Fourier expansions, higher order ODEs and assess the smoothness of the function by using the mean value theorems<br>**CO6**:Students will gain the skill to formulate periodic functions, modeling of initial value problems and boundary value problems and behaviour of smooth functions |
| 4 | 16CS4C03 | COMPUTER SCIENCE IV (OPERATING SYSTEM AND 4 UNIX) | **CO1**: Describe the evolution, types and fundamental components of a computer operating system<br>**CO2**: Define, discuss, and explain the policies for CPU scheduling, deadlocks, memory management, and file systems.<br>**CO3**: Implement processor scheduling, deadlocks and page replacement algorithms for a given scenario.<br>**CO4**: Execute Linux basic commands and shell scripts.<br>**CO5**: Create shell scripts to automate a sequence of operations.<br>**CO6**: Discuss managing user accounts, disk space and security issues |

| Sem | Subject Code | Subject | Course Outcomes |
|-----|-------------|---------|-----------------|
| 4 | 16PHY4C1L | PHYSICS LAB-IV | **CO1**:Understand the working principles of instruments used in experiment<br>**CO2**: Acquire the experimental skills in concepts like GM counter,Molecular spectroscopy,Laser and Atomic Physics<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |
| 4 | 16CS4C3L | COMPUTER SCIENCE IV LAB | **CO1**: Explain the operators, and control structures that can be used to write shell programs.<br>**CO2**: Design shell programs to interpret the concepts of operating system.<br>**CO3**: Design shell programs that helps the functionalities of system administrator. |
| 5 | 16ECO5G01 | ELEMENTS OF ENTREPRENEURSHIP<br>General Elective-I | **CO1** :Outline the function of the entrepreneur in the successful, commercial application of innovations and recall the different opportunities and successful growth stories.<br>**CO2** :Learn how to start an enterprise and design business plans that are suitable for funding by considering all dimensions of business.<br>**CO3** :Prioritize personal attributes that enable best use of entrepreneurial opportunities<br>**CO4** :Examine Economic conditions with higher level knowledge and understanding of contemporary trends in e-commerce and business finance.<br>**CO5** :Explore entrepreneurial leadership and management style. |
| 5 | 16CHE5G01 | ELEMENTS OF CHEMISTRY<br>General Elective-I | **CO1**: Outline the stoichiometric and acid-base concepts. Summarize the chemical properties and biological importance of water.<br>**CO2**: Interpret chemical kinetics of various chemical reactions and colloidal concepts.<br>**CO3**: Explain the electronic configuration, properties of the elements across the period - down the group and radioactivity.<br>**CO4** : Theorize an adequate knowledge on the composition, synthesis of dyes, cement, glass and drugs. |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| | 16CHE5G1L | Generic Elective – I Elements of Chemistry (Practical) | **CO1**: Summarize the principles of volumetric analysis. <br> **CO2**: Interpret the end point of various volumetric titrations. <br> **CO3**: Illustrate the preparation of various standard solutions and estimate the given sample. <br> **CO4**: Demonstrate density, viscosity and surface tension of different liquids. |
| 5 | 16MNG5G02 | HUMAN RESOURCE MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR General Elective-II | **CO1** :Demonstrate an understanding of key terms, theories/concepts and practices within the field of HRMSummarize the principles of volumetric analysis. <br> **CO2** :Provide innovative solutions to problems in the fields of HRM and be able to identify and appreciate the significance of the ethical issues in HR <br> **CO3** :Demonstrate competence in communicating and exchanging ideas in a group context <br> **CO4** :Work effectively with colleagues with diverse skills, experience levels and way of thinking <br> **CO5** :Evaluate HRM related social, cultural, ethical and environmental responsibilities and issues in a global context <br> **CO6** :To integrate the knowledge of HR practices Related monetary benefits to avail within the organization. |
| 5 | | BASIC ELECTRONICS AND INSTRUMENTATION SKILLS Skill Elective-I | **CO1**:Basic knowledge and understanding about semiconductor devices, their applications in electronic systems. <br> **CO2**:Knowledge on designing integrated circuits with their application and knowledge on logic circuits. <br> **CO3**:Understanding the principle and working of various electronic instruments like RPS, regulators, measuring instruments and biomedical instruments their applications |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 5 | 16STAT5S02 | BASIC STATISTICS<br><br>Skill Elective-I | **CO1**: Understanding the meaning of statistics, scope and limitations, types of data and method of data collection<br>**CO2**: Analyzing the data graphically using frequency distributions<br>**CO3**: Describe the data using measure of central tendency<br>**CO4**: Identifying the scatteredness of data using measure of dispersion<br>**CO5**: Analyzing and evaluating the data using correlation and regression. |
| 5 | 16PHY5S03 | RENEWABLE ENERGY AND ENERGY HARVESTING<br>Skill Elective-II | **CO1**:Understanding of basic facts of worldwide renewable energy production and consumption statistics and basics principle of different forms of renewable energy production.<br>**CO2**:Demonstrate knowledge of different direct solar energy applications and devices<br>**CO3**: Ability to identify renewable energy harvesting productions like wind and biomass energy<br>**CO4**: Equipped with basic experimental skills in solar cells, wind mills and biomass energy production. |
| 5 | 16CS5S03 | SOFTWARE ENGINEERING AND TESTING<br>Skill Elective-II | **CO1**: Explain the different process models for a software project development.<br>**CO2**: Discuss SRS, Design document, Project planning and scheduling<br>**CO3**: Classifying test types and generating test cases using different techniques<br>**CO4**: Discuss different techniques for cost estimation of software |
| 5 | 16MATH5S04 | MATHEMATICAL MODELING<br>Skill Elective-III | **CO1**:Research on the various procedures and concepts of mathematical modeling involving applications of differential equations theory.<br>**CO2**:Gain the skill sets in understanding the behavior of various functions arising in the mathematical models involving one real variable.<br>**CO3**: Understand the dynamics of planetary motion<br>**CO4**:Analyse the behavior of growth and decay phenomena in nature<br>**CO5**:Gain skill to analyse and debate on macroeconomic phenomena |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 5 | 16CS5S04 | PROGRAMMING IN ANDROID<br>Skill Elective-III | **CO1**: Describe the basic components of an Android application, Differentiating and identifying electronic components used in RE sector to convert renewable energy source to electricity and its commuting. Life cycle of an activity and event handling in Android<br>**CO2**: Design a graphical user interface<br>**CO3**: Demonstrate skills to work with databases.<br>**CO4**: Utilize Android Studio to create simple applications<br>**CO5**: Create applications that contain SMS, Email and Google Map facility |
| 5 | | BASIC ELECTRONICS AND INSTRUMENTATION SKILLS<br>- LAB<br>Skill elective lab -2 | **CO1**:Differentiating and identifying electronic components used in electronic circuits and its commuting.<br>**CO2**:Performance of electronic circuits using passive components, diodes, transistors, ICs for different applications.<br>**CO3**:Understanding the basic applications of linear ICs, Op-amp and digital electronic circuits in control and conversions systems.<br>**CO4**:Knowledge on Regulated power supply (RPS) used in circuits and systems. |
| 5 | 16STAT5S2L | BASIC STATISTICS LAB<br>Skill elective lab -2 | **CO1**: Construct the frequency distribution for the given data<br>**CO2**: Evaluate the measures of central tendency for grouped and ungrouped data<br>**CO3**: Evaluate the measures of dispersion for grouped and ungrouped data<br>**CO4**: Examine the graphical representation of data<br>**CO5**: Apply correlation and regression analyses for the data and examine the results. |
| 5 | 16PHY5S3L | RENEWABLE ENERGY AND ENERGY HARVESTING LAB<br>Skill elective lab -4 | **CO1**:Understand the working principles of instruments used in experiment<br>**CO2**: Acquire the experimental skills in concepts like Solar cells, Wind mill and Bio waste conversion to electrical energy.<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 5 | 16CS5S3L | SOFTWARE ENGINEERING AND TESTING LAB<br>Skill elective lab -4 | **CO1**: Discuss the different types of testing and develop test cases for boundary value analysis, equivalence class partitioning, path testing and explain with a suitable program.<br>**CO2**: Develop test cases for automated unit testing, parameterized testing and perform tests using JUnit tool.<br>**CO3**: Derive test cases for assertions and test using JUnit.<br>**CO4**: Discuss load testing and perform real time load testing using Apache JMeter and find response time, delay time and throughput time.<br>**CO5**: Analyze and translate software requirements specification into a design, and then realize that design using a suitable software engineering methodology. |
| 5 | 16MATH5S4L | MATHEMATICAL MODELING LAB<br>Skill elective lab -6 | **CO1**: Recall differential equations programming through symbolic software packages .<br>**CO2**: Understand iterative processes involved in Mathematical models related to numerical schemes.<br>**CO3**: Acquire knowledge of using solutions of ODE's for applications .<br>**CO4**: Classify different aspects of modeling of non-linear phenomena through computer coding using appropriate methods .<br>**CO5**: Learn to evaluate graphs related to mathematical models and use various graphical packages of ODE's . |
| 5 | 16CS5S4L | PROGRAMMING IN ANDROID LAB<br>Skill elective lab -6 | **CO1**: Apply Java programming concepts to Android app development.<br>**CO2**: Design and develop User Interfaces for the Android application<br>**CO3**: Explain image properties and use styles and themes to separate the details of the app design from the UI structure and behavior.<br>**CO4**: Discuss content providers and permissions, and the APIs to retrieve and modify data from content providers and develop a simple app using content providers.<br>**CO5**: Explain database connectivity and to work with SQLite databases. |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 6 | 16PHY6D101 | ASTROPHYSICS AND SOLAR PHYSICS<br>Discipline Elective-I | **CO1**: Understanding of the different stages of evolution of stars and basic properties of stars.<br>**CO2**:Knowledge of observational astronomy, galaxies, cosmology, nebulae, star clusters, interstellar dust and dark matter.<br>**CO3**: Demonstrate a deep learning in solar Astrophysics.<br>**CO4**:Equipped with good basic experimental skills in Astrophysics. |
| 6 | 16PHY6D102 | MATERIALS SCIENCE<br>Discipline Elective-I | **CO1**:Understanding of synthesis techniques, properties and applications of nano and smart materials<br>**CO2**: Demonstrate good foundations in band theory of solids and free electron theory of metals.<br>**CO3**: Ability to differentiate between the different types of magnetic materials and a good insight of dielectric materials.<br>**CO4**: Equipped with good experimental skills in understanding the properties of different materials |
| 6 | 16PHY6D103 | ANALOG AND DIGITAL ELECTRONICS<br>Discipline Elective-I | **CO1**:Understanding the basics of EM waves and analog communication systems for transfer of information.<br>**CO2**:Quantitative knowledge on modern communication system technology used in the field of Radio, TV,mobile etc. Demonstrate and analyze communication systems used in various fields.<br>**CO3**:Inspect the basic concepts of the digital electronics, logic gates, 8051 microcontroller and their applications.<br>**CO4**:Different techniques of assembly language programming and embedded C programming for 8051 microcontroller along with interfacing techniques of IO devices. |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 6 | 16MATH6D211 | LINE AND MULTIPLE INTEGRALS, INTEGRAL THEOREM AND DIFFERENTIAL CALCULUS OF TWO VARIABLES<br>Discipline Elective-II | **CO1**:Students will recall the basic concepts of integration and differentiation<br>**CO2**:Students will gain the skill sets to understand multivariable functions.<br>**CO3**:Students will gain knowledge on applications in multivariate calculus especially solutions to problems involving line and multiple integrals<br>**CO4**:Students will analyze multivariable functions and address solution of certain optimization problems<br>**CO5**: Students will gain knowledge to evaluate surface and volume integrals and optimal values<br>**CO6**: Students will gain the skill to derive the theorems connecting line and multiple integrals |
| 6 | 16MATH6D221 | RING THEORY, PARTIAL DIFFERENTIAL EQUATION<br>Discipline Elective-II | **CO1**:Students will recall concepts of binary operations and partial differentiation<br>**CO2**:Students will understand the concept of ideals and quotient rings and the formation of elementary partial differential equations.<br>**CO3**:Students will learn to illustrate the behavior of functions and solve different forms of PDEs<br>**CO4**:Students will gain knowledge to classify rings and analyze the situation where partial differentiation can be applied<br>**CO5**:Students will learn to evaluate solutions to various algebraic problems and partial differential equations<br>**CO6**: Students will derive standard results in ring theory and PDEs |

| Sem | Subject Code | Subject | Course Outcomes |
|-----|--------------|---------|-----------------|
| 6 | 16MATH6D212 | GEOMETRYOF SPACE CURVES, VECTOR DIFFERENTIAL CALCULUS AND IMPROPER INTEGRALS<br>Discipline Elective-III | **CO1**:Students will recall basic concepts from vector algebra and integral calculus<br>**CO2**: Students will understand the relation between differential operators and behavior of improper integrals.<br>**CO3**:Students will learn to solve problems on vector differential calculus and improper integrals<br>**CO4**:Students will start analyzing the action of the operators on scalars and vectors and behavior of improper integrals<br>**CO5**:Students will be able to learn measurements involving space curves and definite integrals<br>**CO6**:Students will learn to derive standard results in vector differential calculus, geometry of space curves and improper integrals |
| 6 | 16MATH6D222 | LINEAR ALGEBRAAND NUMERICAL ANALYSIS<br>Discipline Elective-III | **CO1**:Students will recall basic concepts of vector algebra and numerical methods<br>**CO2**:Students will understand the concepts of linear transformation, forward, backward and divided differences<br>**CO3**:Students will learn to apply basis vectors and solve various problems numerically, pertaining to finite differences and integration<br>**CO4**:Students will get the skill to analyze vector spaces and classify them they also learn to analyze various operators used in numerical methods<br>**CO5**:Students will gain the knowledge to evaluate rank, nullity and value of definite integrals using numerical methods<br>**CO6**:Students will learn to formulate theories regarding vector spaces and develop skill to find approximations using various numerical techniques |
| 6 | 16CS6D303 | COMPUTER NETWORKS<br>Discipline Elective-IV | **CO1**: Discuss the basic concepts of computer networks, the transmission media, and the components used in computer networks.<br>**CO2**: Explain the functionalities and protocols of various layers used inOSI Network model<br>**CO3**: Classify routing algorithms used in network layer and the strategies for routing<br>**CO4**: Describe the techniques for congestion control and congestion avoidance<br>**CO5**: Describe network security issues and some of the methods that address them |

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| 6 | 19MENVI0VE2 | Environmental Studies | **CO1** - Understanding the nature of our Environment and its importance in real Life<br>**CO2** - To summarize the basic concepts of ecosystems and their functions<br>**CO3** - To Classify the organisms based on the geographical areas, Ecological niche and Threats faced<br>**CO4** - Explain the causes and outcomes of Environmental Pollution on this planet<br>**CO5** - To create an awareness about the possible solutions to the environmental problems faced by mankind.<br>**CO6** - To develop the right attitude towards the environment which eventually helps to deal with environmental problems |
| 6 | 16CS6D304 | RELATIONAL DATABASE MANAGEMENT SYSTEM<br>Discipline Elective-IV | **CO1**: Describe the fundamental elements of database management systems<br>**CO2**: Explain the basic concepts of entity-relationship model<br>**CO3**: Explain the basic concepts of relational data model, and relational algebra<br>**CO4**: Design tables for a specific database and write SQL queries for data definition/ manipulation/ alteration<br>**CO5**: Recognize and apply functional dependencies to improve database design (Normalization)<br>**CO6**: Analyze the requirements of transaction processing, concurrency control |
| 6 | 18BSDA301 | INFERENCE THEORY GENERAL ELECTIVE-III | **CO1**:Understand and Calculate Probabilities by applying Probability Laws and Theory.<br>**CO2**:Identify appropriate Probability Distribution for a given discrete or continuous random variable.<br>**CO3**: Application of Probability Theorems and Distributions concerning multiple random variables and compute probabilities.<br>**CO4**: Understand and differentiate statistical methods to draw conclusions.<br>**CO5**:Compute large sample, small sample tests and make inference about the phenomena. |

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| 6 | 16FS6G402 | DOCUMENT ANALYSIS GENERAL ELECTIVE-III | **CO1**: Define documents, Questioned documents, exemplars, handwriting, disguise, forgery, secret writing, alterations, special documents, inks, security documents, stamps and seals etc<br>**CO2**: Classify documents, papers, examples, forgery, disguise, alterations, inks, impressions, printers and typewriters.<br>**CO3**: Explain the roles, duties and qualification of a document expert as well as the factors that influence handwriting.<br>**CO4**: Examine fraudulent documents, handwritings, signatures, mechanical impressions, sequence of stroke, security documents and special documents<br>**CO5**: Examine questioned documents to give opinion and write a report. |
| 6 | 16PHY6D1L1 | ASTRO PHYSICS AND SOLAR PHYSICS LAB Discipline Specific Elective lab -6 | **CO1**:Understand the working principles of instruments used in experiment<br>**CO2**: Acquire the experimental skills in concepts like Surface temperature of stars, Rotational time period of stars, Mass of binary stars, Distance of Cepheid variables and HR-diagram.<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |
| 6 | 16PHY6D1L2 | MATERIALS SCIENCE LAB Discipline Specific Elective lab -6 | **CO1**:Understand the working principles of instruments used in experiment<br>**CO2**: Acquire the experimental skills in concepts like Energy band gap of materials, Permeability of materials, Fermi energy of materials and Dielectric constant of materials.<br>**CO3**:Analyze the results with observations and proper theory<br>**CO4**:Gain knowledge about application of the experiments |

| Sem | Subject Code | Subject | Course Outcomes |
|---|---|---|---|
| 6 | 16PHY6D1L3 | ANALOG AND DIGITAL ELECTRONICS LAB Discipline Specific Elective lab -6 | **CO1**:Understanding the basics modulation methods (AM, FM & PM) used in communication systems for transfer of information. **CO2**:Knowledge on audio crossover networks and its effect in audio communication systems. **CO3**:Idea on modern communication system technology used in the field of telephone, internet and other communication systems like OFE. **CO4**:Basic concepts of the digital electronics, logic gates, 8051 microcontroller and their applications in communication systems **CO5**:Different techniques of assembly language programming and embedded C programming for 8051 microcontrollers along with interfacing techniques of IO devices. |
| 6 | 16CS6D3L3 | COMPUTER NETWORKS LAB Discipline Specific Elective lab -7 | **CO1**: Explain the working of Routing Information Protocol (RIP), Broader Gateway Protocol (BGP), Open Shortest Path First (OSPF) protocol and simulate using cisco packet tracer tool. **CO2**: Understand and explain the concept of error correction and error detection. **CO3**: Understand and explain the basics of network security and discuss transposition cypher algorithm and RSA algorithm. |
| 6 | 16CS6D3L4 | RELATIONAL DATABASE MANAGEMENT SYSTEM LAB Discipline Specific Elective lab -7 | **CO1**: Explain the data types, operators, and constraints in SQL and the general form of SQL commands **CO2**: Write SQL queries for data definition/manipulation/alteration**CO3**: Declare and enforce different constraints on a database **CO4**: Write SQL queries to get information from two tables using join operations **CO5**: Write SQL queries to create sub groups of tuples and apply aggregate functions to produce summary reports. |

| Sem | Subject Code | Subject | Course Outcomes |
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| 6 | 16MATH6G4L1 | INFERENCE THEORY – LAB<br>General Elective Lab - 2 | **CO1**: Describe the procedure to evaluate the mathematical expectation of discrete and continuous random variables.<br>**CO2**: Examine the collected sample and assess different probability distributions.<br>**CO3**: Test the collected sample (quantitative) and report the results based on small sample theory in statistics.<br>**CO4**: Test the sample and report the results based on large sample theory in statistics.<br>**CO5**: Test the sample and report the results based on non-parametric method (chi-square statistic) in statistics. |