**Format for PSO and CO for AY 2019-20**

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| **Name of Faculty** | **Science and Technology** |
| **Name of Department** | **Computer Science** |
| **UG Programme** | **B.Sc. Computer Science** |
| **Programme Specific Outcomes (PSO)** |
| 1. To develop students for problem solving abilities using a computer.2. To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.3. To imbibe quality software development practices. 4. To boost and inspire students in professional skills related to Software development in Industries. 5. To help students build-up a successful career in Computer Science. |
| **Course Outcomes (CO) F.Y.B.Sc.Computer Science - Choice Based Credit System** |
| **Semster-I****Theory Courses****CS101 : Problem Solving Using Computer and ‘C’ Programming – I Credits– 02**1. Explore algorithmic approaches to problem solving.2. Develop modular programs using control structures and arrays in ‘C’. Course.**CS102 : Database Management Systems Credits– 02**1. Solve real world problems using appropriate set, function, and relational models. 2. Design E-R Model for given requirements and convert the same into database tables. 3.Use SQL. **Practical Course****CS103 : Practical course Problem Solving using Computer and ‘C’ programming and Database Management Systems Teaching Credits – 1.5**1.Devisepseudo codes and flowchart for computational problems. 2.Write, debug and execute simple programs in ‘C’. Create database tables in postgreSQL. Write and execute simple, nested queries.**Semester-II****Theory Courses****CS201 : Advanced ‘C’ Programming Teaching Credits – 02**1Develop modular programs using control structures, pointers, arrays, strings and structures2. Design and develop solutions to real world problems using C. **CS202 : Relational Database Management Systems Credits – 02**1.Design E-R Model for given requirements and convert the same into database tables. 2.Use database techniques such as SQL & PL/SQL.3. Explain transaction Management in relational database System. 4. Use advanced database Programming concepts **Practical Course****CS203 : Practical Course on Advanced ‘C’ Programming and Relational Database Management Systems Credits – 1.5**1.Write, debug and execute programs using advanced features in ‘C’.2. To use SQL & PL/SQL and perform advanced database operations.  |
| **Programme Specific Outcomes (PSO) F.Y.B.Sc.Comp.Sci. - Electronics** |
| 1.To provide knowledge of technological and practical aspects of electronics. 2. To familiarize with current and recent technological developments.3. To enrich knowledge through activities such as industrial visits, seminars, projects etc.4. To train students in skills related to computer industry and market.5.To create foundation for research and development in Electronics/ Computer Science. 6. To develop analytical abilities towards real world problems7. To help students to build-up a progressive and successful career. |
| **Course Outcomes (CO) F.Y.B.Sc.Comp.Sci. - Electronics** |
| **Semester-I****Theory Courses****ELC-111: Semiconductor Devices and Basic Electronic Systems – Credits 02**1. Develop interest in study various types of semiconductor devices 2. Explorestudy elementary electronic circuits and systems**ELC 112: Principles of Digital Electronics - Credits 02**1. Students familiar with concepts of digital electronics 2. Learn number systems and their representation3. Develop and understand basic logic gates, Boolean algebra and K-maps4. Getting knowledge of arithmetic circuits, combinational circuits and sequential circuits**Practical Course****ELC-113: ELECTRONICS LAB IA - 1.5 Credits**1. Use of 3 Pin Regulator IC 78XX & 79XX as a regulator in real life.2. Develop the complete knowledge about of half wave, full wave and bridge rectifier circuit with and without capacitor filters.3. Get practical knowledge aboutOpto-coupler using LED and Photodiode and it’s application as burglar alarm4. Bipolar Junction Transistor as a Switch in real life. **Semester-II****Theory Courses****ELC 121: Instrumentation Systems Credits 02**1. Get knowledge of Instrumentation System 2.Develop and explore various blocks of Instrumentation System 3. To study Smart Instrumentation System**ELC 122 : Basics of Computer Organisation Credits02**1. Make familiar with digital sequential circuits2. Get knowledge about Basic computer Organization in real life3.Develop knowledge about Memory architecture **Practical Courses****ELC-123: Electronics Lab IB Credits 1.5**1.Study temperature sensor LM 352. Use of LDR to control light intensity3. Study of PIR and tilt sensor.4. Study of stepper motor and Use of OPAMP as comparator**Programme Specific Outcomes (PSO)F.Y.B.Sc.Comp.Sci. – Mathematics** |
| 1. Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerous power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting. 2. Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science and technology. 3. Enhancing students’ overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment .4. Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study. |
| **Course Outcomes (CO)F.Y.B.Sc.Comp.Sci. - Mathematics** |
| **Semester – I****Theory Courses****MTC-111: Matrix Algebra Credits - 2**1. A students should be able to work with graphs and identify certain parameters and properties of the given graphs. 2. A students should be able to perform certain algorithms, justify why these algorithms work, and give some estimates of the running times of these algorithms. 3. A students should be able to solve basic exercises of the type: given a graph with properties X, prove that the graph also has property Y.**MTC 112: Discrete Mathematics Credits - 2**1. A students should develop an appreciation for the literature on the subject and be able to read and present results from the literature.2.A students should be able to write cohesive and comprehensive solutions to exercises and be able to defend their arguments.**Practical Course****MTC 113: Mathematics Practical Credits – 1.5**1.Getting knowledge of Maxima Software and using them in mathematics and its uses in real life.2. Usingthese software students can solve and manipulate symbolic and numerical expressions, including differentiation, integration.3. Using maxima software for plot functions and data in two and three dimensions.**Semester – II****Theory Courses****MTC-121: Linear Algebra Credits 2**1. Analyze and use linear, exponential, and quadratic models to answer questions about the situations they represent. In particular, relate graphical features (like the x- and y-intercepts and the vertex of a parabola) to specific aspects of the situation being modeled. For quadratics, be able to rewrite the function appropriately in order to find the information desired.2. Construct algebraic models to describe real-life situations.3. Solve linear, quadratic, exponential, logarithmic and square root equations. This includes solving quadratic equations using the zero-product property, completing the square, and the quadratic formula.**MTC-122: Graph Theory Credits 2**1.Solve problems using basic graph theory. Identify induced sub graphs, cliques, matchings, covers in graphs.2.Determine whether graphs are Hamiltonian and/or Eulerian and Solve problems involving vertex and edge connectivity, planarity and crossing numbers.3.Solve problems involving vertex and edge coloring and Model real world problems using graph theory.**Practical Courses****MTC 123: Mathematics Practical Credits 1.5**1. Students gets sufficient knowledge of fundamental principles, methods and a clear perception of innumerous power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting.
2. Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science and technology.
3. Enhancing students’ overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment .
4. Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

**Programme Specific Outcomes (PSO) F.Y.B.Sc.Comp.Sci. - Statistics** |
| 1.Statistics deals with any decision making activity in which there is certain degree of uncertainty.2.Statistics helps in taking decisions in an objective and rational way.3.The student of Statistics can study it purely theoretically which is usually done in research activity or it can be studied as asystematic collection of tools and techniques to be applied in solving a problem inreal life. |
| **Course Outcomes (CO)F.Y.B.Sc.Comp.Sci. - Statistics** |
| **Semester-I****Theory Courses****CSST 111 :Descriptive Statistics Credits – 2**1.Students getting knowledge of mean,median,mode,range,varience and standard deviation.2. Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions. 3. Define binomial outcomes and compute probability of getting X successes in N trials.4.Identify the characteristics of different discrete and continuous distributions.5.Identify the type of statistical situation to which different distributions can be applied2.**CSST 112 :Mathematical Statistics Credits – 2**1. Use Poisson, exponential distributions to solve statistical problems.2. Use the normal probability distribution including standard normal curve calculations of appropriate areas. 3. Use different distributions to solve simple practical problems.4. Analyze Statistical data using MS-Excel. **Practical Courses****CSST113: Statistics Practical Credits – 1.5** 1. To tabulate and make frequency distribution of the given data. 2. To use various graphical and diagrammatic techniques and interpret. 3. To compute various measures of central tendency, dispersion, Skewness and kurtosis.4.To fit the Binomial and Poisson distributions. To compute the measures of attributes. 5. The process of collection of data, its condensation and representation for real life data. **Semester-II****Theory Courses****CSST 121 :Methods of Applied Statistics Credits 02**1.Students will demonstrate their ability to apply statistics in other fields at an appropriate level and demonstrate their ability to apply knowledge acquired from their major to real world models.2.Students will demonstrate mastery of data analysis and statistical concepts by communicating critically reasoned analysis through written and oral presentations.3.Students will acquire up-to-date skills and/or applications of computer and statistical programming related to future career choices.4.Students will apply their knowledge of statistics through an in-depth senior project/research experience. Results will be presented in both written (paper, publication, portfolio, etc.) and visual (PowerPoint, poster, portfolio, etc.) formats.5.Students will be able to read, interpret, and critically analyze journal articles directed at undergraduate students.**CSST122: Continuous Probability Distributions and Testing of Hypotheses****Credits 02**1.Use a probability distribution for a continuous random variable to estimate probabilities and identify unusual events.2.One continuous distribution often used in financial models is the uniform distribution, in which each possible outcome has the same probability of occurrence as any other outcome; hence, there is no clustering of values.**Practical Course****CSST 123: Statistics Practical Credits 1.5**1.To understand the relationship between two variables using scatter plot.2.To compute coefficient of correlation, coefficient of regression.3.To fit various regression models and to find best fit.4.To fit the Normal distribution. To understand the trend in time series and how to remove it.**Programme Specific Outcomes (PSO)S.Y.B.Sc.Comp.Sci. Computer** |
| 1.To develop problem solving abilities using a computer2. To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems. 3.To imbibe quality software development practices. To create awareness about process and product standards4. To train students in professional skills related to Software Industry. |
| **Course Outcomes (CO) S.Y.B.Sc.Computer Science** |
| **Theory Courses****CS 211- DATA STRUCTURES USING ‘C’**1. To learn the systematic way of solving problem 2. To understand the different methods of organizing large amount of data 3. To efficiently implement the different data structures 4. To efficiently implement solutions for specific problems**CS-212-Relational Database Management System** 1.To teach fundamental concepts of RDBMS (PL/PgSQL) 2.To teach principles of databases 3.To teach database management operations 4.To teach data security and its importance 5.To teach client server architecture**Semester-II****Theory Courses****Semester II CS 221 -Object Oriented Concepts using C++**  1. Acquire an understanding of basic object oriented concepts and the issues involved in effective class design2. Write C++ programs that use object oriented concepts such as information hiding, constructors, destructors, inheritance etc.**CS - 222: Software Engineering** 1.To teach basics of System Analysis and Design. 2.To teach principles of Software Engineering 3.To teach various process models used in practice 4.To know about the system engineering and requirement engineering and to build analysis model**Practical Course****CS-223 : Data structures Practicals and C++ Practicals**1. Design and implement Data structures and related algorithms 2. Understand several ways of solving the same problem. **CS-224:Database Practicals& Mini Project using Software Engineering techniques**1.Understanding the use of cursors, triggers, views and stored procedures2.Understanding the steps of system analysis and design 3.Understanding Data requirements for a specific problem domain 4. Designing Data base as per the Data requirements |
| **Programme Specific Outcomes (PSO) S.Y.B.Sc.Comp.Sci. Mathematics** |
| 1. Give the students a sufficient knowledge of fundamental principles ,methods and a clear perception of innumerous power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting. Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science. 2. Enhancing students’ overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment . Enabling students to develop a positive attitude towards mathematics as aninteresting and valuable subject of study.  |
| **Course Outcomes (CO) S.Y.B.Sc.Computer Science - Mathematics** |
| **Semester –I****Theory Courses****MTC - 211 : Applied Algebra**1.A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays ,state important facts resulting from their studies. 2.A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning. **MTC - 212 : Numerical Analysis**1.A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences. 2.A student be able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion. **Semester –II****Theory Courses****(MTC : 221) : Computational Geometry**1. Constructs algorithms for simple geometrical problems.2.Implement computational geometry algorithms3. Guide students to develop their own algorithms for solving geometric problems.4.Make able students to implement the algorithms .**(MTC:222) : Operations Research**1.Know principles of construction of mathematical models of conflicting situations and mathematical analysis methods of operations research.2.Be able to choose rational options in practical decision-making problems using standard mathematical models of operations research.3.Have skills in analysis of operations research objectives, mathematical methods and computer systems.**Semester –II****Practical Courses****MTC -223 Practical**1. Understand the need for simulation/implementation for the verification of mathematical functions. 2. Understand the main features of the SCILAB program development environment to enable their usage in the higher learning. 3. Implement simple mathematical functions/equations in numerical computing environment such as SCILAB.4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using SCILAB tools. |
| **Programme Specific Outcomes (PSO)S.Y.B.Sc.Comp.Sci. - Electronics**1.To provide knowledge of technological and practical aspects of electronics.2.To familiarize with current and recent technological developments.3.To enrich knowledge through activities such as industrial visits, seminars, projects etc.4.To train students in skills related to computer industry and market5.To create foundation for research and development in Electronics/ Computer Science. • To develop analytical abilities towards real world problems .To help students to build-up a progressive and successful career.**Course Outcomes (CO) S.Y.B.Sc.Computer Science - Electronics****Semester-I****Theory Courses****(ELC 211): Digital System Hardware** 1. Develop and getting knowledge about the applications of logic gates.2. Make use of K-maps for digital circuit design in life. Study and understand basics of microprocessors3. Understand fundamentals of multicore technology.**(ELC 212) : Analog Systems** 1.To understand basics of analog electronics2) To study different types of sensors3) To understand different types of signal conditioning circuits4) To learn data conversion techniques.To apply knowledge of analog systems in different applications **Semester – II****Theory Courses****(ELC 221) :The 8051 Architecture, Interfacing & Programming**1. Understand basics of analog electronics. Study different types of sensors 2. Understand different types of signal conditioning circuits 3. Learn data conversion techniques. Developing knowledge of analog systems in different applications **(ELC 222) Communication Principles** 1. To understand basics of communication systems. 2. To understand modulation, demodulation and multiplexing of signals. 3. To understand digital communication techniques 4. To introduce concepts in advanced wireless communication. **Practical Courses****Paper- III: Practical Course (ELC-203)**  1. To use basic concepts for building various applications in electronics. 2. To understand design procedures of different electronic circuits as per requirement. 3. To build experimental setup and test the circuits. 4. To develop skills of analyzing test results of given experiments |
| **Programme Specific Outcomes (PSO)T.Y.B.Sc.Comp.Sci. - Computer** |
| 1. To develop students for problem solving abilities using a computer.2. To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.3. To imbibe quality software development practices.  |
| **Course Outcomes (CO) T.Y.B.Sc.Computer Science** |
| **Semester III****Theory Course****CS-331 Systems Programming** 1. To understand the design and implementation issues of System programs that play an important role in program development. 2. To understand the design structure of a simple editor. 3. To understand the design structure of Assembler and macro processor for an hypothetical simulated computer.4. To understand the working of linkers and loaders and other development utilities. 5.To understand Complexity of Operating system as a software.**CS-332 Theoretical Computer Science**1. To have a introductory knowledge of automata, formal language theory and computability.2. To have an understanding of finite state and pushdown automata. 3. To have a knowledge of regular languages and context free languages. 4. To know the relation between regular language, context free language and corresponding recognizers. 5. To study the Turing machine and classes of problems.**CS-333 : Computer Networks -I** 1. This course will prepare students in Basic networking concepts. 2. Understand different types of networks, various topologies and application of networks. 3. Understand types of addresses, data communication.4. Understand the concept of networking models, protocols, functionality of each layer. 5. Learn basic networking hardware and tools.**CS-334 : Internet Programming I** 1.To Design dynamic and interactive Web pages. 2.Learn Core-PHP, Server Side Scripting Language.3.Learn PHP-Database handling. Prerequisite**CS-335: Programming in Java-I** 1. To learn Object Oriented Programming language
2. To handle abnormal termination of a program using exception handling
3. To create flat files
4. To design User Interface using Swing and AWT

**CS-336 : Object Oriented Software Engineering** 1.To Understand Object Oriented Modeling techniques and their applicability. 2.Understanding importance of Object Orientation in Software engineering3. Understand the components of Unified Modeling Language 4. Understand techniques and diagrams related to structural modeling and behavioral modeling 6. Understand techniques of Object Oriented analysis, design and testing**Semester IV****Theory Course****CS-341 :Operating System.** 1. To understand design issues related to process management and various related algorithms
2. To understand design issues related to memory management and various related algorithms
3. To understand design issues related to File management and various related algorithms

**CS-342 : Compiler Construction** 1.To understand the various phases of a compiler and to develop skills in designing a compiler 2.To understand design issues of a lexical analyzer and use of Lex tool 3. To understand design issues of a parser and use of Yacc tool4.understand issues related to memory allocation 4. To understand and design code generation schemes**CS-343 : Computer Networks -II** 1. Basic networking concepts. 2. Understand wired and wireless networks, its types, functionality of layer. 3. Understand importance of network security and cryptography.**CS-344 : Internet Programming II** 1.To Design dynamic and interactive Web pages.2. Learn different technologies used at client Side Scripting Language 3.Learn XML,CSS and XML parsers.4.One PHP framework for effective design of web application.  Learn JavaScript to program the behavior of web pages. 5.Learn AJAX to make our application more dynamic. **CS-345 :Programming in Java-II** 1. To learn database programming using Java 2.To study web development concept using Servlet and JSP 3.To develop a game application using multithreading 4.To learn socket programming concept **CS-346 : Computer Graphics** 1. Computer programming skills in C programming language2. Basic understanding of use of data structures 3.Basic Mathematical concepts related to matrices and geometry**Practical Course****CS-347 : System Programming & Operating System** 1. Understand the process of designing and implementing System programs and operating system components.2. Design and implement System programs with minimal features to understand their complexity. 3. Design and implement simulations of operating system level procedures.**CS 348:Lab Course II – Programming in Java** 1.To develop understanding the process of designing and implementing Core and Advanced Java programs. 2. Implement core Java programs to solve simple problems .Implement Client and Server end Java programs **CS-349 : Lab Course III – Programming in PHP & Project** 1. Understand the process of designing and implementing Web applications, using PHP. 2. Implement Simple PHP programs to solve simple problems. |