



**CHRIST  
NAGAR  
COLLEGE**

A  
CMI  
Educational  
Institution  
Affiliated to  
the University  
of Kerala

MARANALLOOR, THIRUVANANTHAPURAM



**PROGRAMME OUTCOMES**  
**PROGRAMME SPECIFIC OUTCOMES**  
**COURSE OUTCOMES**

**UNDER GRADUATE – BA, BCOM, BSC, BBA, BCA**

**PROGRAMME OUTCOME (PO)**

On completion of a UG Programme from Christ Nagar College, students should be able to demonstrate the **programme outcomes** listed below:

**PO1:PROFESSIONALISM AND ETHICS-** Demonstrate accountability and professionalism that is rooted in ethical, altruistic, moral, and humanistic principles.

**PO2:LEADERSHIP AND SOCIAL ACUITY** - Capable of taking responsibilities as a leader and demonstrate responsiveness to the regional and national environments developing abilities to manage challenges for nation building.

**PO3:DIGITAL COMPETENCE:** Able to use technology and skills to process information and data for the benefit of the society.

**PO4:COMMUNICATION AND TEAM WORK-** Interact effectively with stakeholders, fostering an environment of team work, mutual respect and shared decision making skills.

**PO5:CRITICAL THINKING** - Foster in students an inquisitive mind to analyze and develop capacity to become an active learner through critical thinking.

---

**POST GRADUATE – MCOM, MA, MSC**

**PROGRAMME OUTCOME (PO)**

On completion of a PG Programme from Christ Nagar College, students should be able to demonstrate the **programme outcomes** listed below:

**PO1: RESEARCH AND QUALITY:** Nurture research mind set through quality in thoughts and scientific temperament. Utilize systems to continuously improve the quality and standards.

**PO2: BEST PRACTICES:** Inculcate a mind set to seamlessly adopt innovation and entrepreneurship, assimilating best-practices for global excellence.

**PO3: LIFELONG LEARNING-** Develop skills and attitude for life-long learning and pursue self-directed learning for refining professional expertise

**PO4: VISIONARY AND MISSION DRIVEN:** Inspire stakeholders to pursue bigger visions through hard work, perseverance and managerial skills

**PO5: GLOBAL OUTLOOK AND SOLUTIONS:** Greater understanding of global problems to ideate and implement solutions

## PROGRAMME SPECIFIC OUTCOME (PSO)

### MSC COMPUTER SCIENCE

**PSO1: Develop** Advanced Knowledge in Data structures, Computer Networks, Database Management Systems, Data Mining, Operating Systems, Information Security, Compiler Design, Distributed Systems and other related courses. **(Apply)**

**PSO2: Use** Mathematical and Optimization Techniques, Cloud Computing and thereby facilitating the students to develop computational problems. **(Apply)**

**PSO3: Implement** experiments for solving real life problems using advanced programming languages and prepare them for doing research. **(Apply)**

### BCA

**PSO1: Explain** the concepts and architecture of computer systems; employ the aspects of environmental consciousness and social intervention **(Understand)**.

**PSO2: Apply** mathematical tools and algorithmic techniques to solve computational problems **(Apply)**.

**PSO3: Develop** software applications using the latest programming languages and technology in the emerging areas of computer applications and develop soft skills and analytical skills to compose innovative solutions and entrepreneurial ventures **(Apply)**.

**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS**

**BCA**

**SEMESTER 1**

| COURSE CODE     | COURSE NAME                                   | COURSE OUTCOME |   |
|-----------------|---|----------------|---|
| <b>EN1111.4</b> | <b>LANGUAGE SKILLS</b>                        | CO1            | <b>Define</b> the tenets of Soft skills and the four fold skills. <b>(Remember)</b>   |
|                 |   | CO2            | <b>Explain</b> elements of basic communication through micro and macro skills <b>(Understand)</b>   |
|                 |   | CO3            | <b>Develop</b> conversational skills through dialogue writings. <b>(Apply)</b>  |
|                 |   | CO4            | <b>Analyse</b> the students' ability as a critical reader and writer. <b>(Analyze)</b>  |
|                 |   | CO5            | <b>Create</b> expertise in business and professional writing to endorse employability. <b>(Create)</b>  |
| <b>MM1131.9</b> | <b>MATHEMATICS 1</b>                          | CO1            | <b>Recall</b> basic differentiation techniques, concepts of prime numbers and general concepts of differential and partial differential equations. <b>(Remember).</b>                         |
|                 |   | CO2            | <b>Discuss</b> hyperbolic and inverse hyperbolic function, Laplace and inverse Laplace transforms, mean value theorem and Rolle's theorem. <b>(Understand)</b>                                |
|                 |   | CO3            | <b>Solve</b> Problems using Leibnitz's theorem Harmonic analysis and Fourier series. <b>(Apply)</b>   |
|                 |   | CO4            | <b>Compute</b> maxima and minima of a function, solution of differential equations, real and imaginary parts of complex numbers and optimum using linear programming problems. <b>(Apply)</b> |
|                 |   | CO5            | <b>Explain</b> unique factorization theorem, Euclidean algorithm, congruence, Fermat's theorem, Wilson's theorem and complex mapping. <b>(Analyze)</b>  |
| <b>CP1121</b>   | <b>COMPUTER FUNDAMENTALS AND ORGANIZATION</b> | CO1            | <b>Describe</b> the basic hardware components of computer system <b>(Understand).</b>   |
|                 |   | CO2            | <b>Compare</b> different memory units, storage devices and various architectures of control unit <b>(Understand)</b>  |

## CHRIST NAGAR COLLEGE

---

|               |                                    |     |   |
|---------------|------------------------------------|-----|---|
|               |                                    | CO3 | <b>Illustrate</b> the concept of instruction set ( <b>Understand</b> )  |
|               |                                    | CO4 | <b>Discuss</b> input-output organization and different modes of data transfer ( <b>Understand</b> )                             |
|               |                                    | CO5 | <b>Discuss</b> transfer Modes( <b>Understand</b> )  |
| <b>CP1131</b> | <b>DIGITAL ELECTRONICS</b>         | CO1 | <b>Memorize</b> the basic concepts of electronics ( <b>Remember</b> )   |
|               |                                    | CO2 | <b>Compute</b> problems related to number system conversions, binary arithmetic operations, SOP, POS and K-map ( <b>Apply</b> ) |
|               |                                    | CO3 | <b>Illustrate</b> the different types of logic gates, flip flops ( <b>Understand</b> )  |
|               |                                    | CO4 | <b>Illustrate</b> the characteristics of different combinational circuits ( <b>Understand</b> )                                 |
|               |                                    | CO5 | <b>Compute</b> problems related to SOP, POS and K-map ( <b>Apply</b> )  |
| <b>CP1141</b> | <b>INTRODUCTION TO PROGRAMMING</b> | CO1 | <b>Explain</b> algorithms, flowchart and basic structure of C programming ( <b>Understand</b> )                                 |
|               |                                    | CO2 | <b>Construct</b> C programs using operators and control structures ( <b>Apply</b> )   |
|               |                                    | CO3 | <b>Apply</b> the concepts of arrays, pointers and functions in C language ( <b>Apply</b> )                                      |
|               |                                    | CO4 | <b>Illustrate</b> the use of string functions in C language ( <b>Apply</b> )  |
|               |                                    | CO5 | <b>Explain</b> the different file handling functions in C-language ( <b>Apply</b> )   |
| <b>CP1142</b> | <b>C PROGRAMMING LAB</b>           | CO1 | <b>Devise</b> programs to demonstrate the use of data types, and operators. ( <b>Apply</b> )                                    |
|               |                                    | CO2 | <b>Devise</b> programs to demonstrate the use of control structures. ( <b>Apply</b> )   |
|               |                                    | CO3 | <b>Develop</b> programs to demonstrate arrays, structures, functions and pointers. ( <b>Create</b> )                            |
|               |                                    | CO4 | <b>Develop</b> programs to demonstrate string handling functions. ( <b>Create</b> )   |
|               |                                    | CO5 | <b>Develop</b> programs to implement the usage of files and library functions. ( <b>Create</b> )                                |
| <b>CP1122</b> | <b>OPEN OFFICE LAB</b>             | CO1 | <b>Apply</b> the features of Linux Operating System ( <b>Apply</b> )  |
|               |                                    | CO2 | <b>Illustrate</b> the working of Linux commands ( <b>Apply</b> )  |
|               |                                    | CO3 | <b>Illustrate</b> the features of word processor and open office worksheets ( <b>Apply</b> )                                    |
|               |                                    | CO4 | <b>Develop</b> creative skills using open office presentation features ( <b>Apply</b> )   |
|               |                                    | CO5 | <b>Develop</b> creative skills using office worksheets and presentations in real life problems. ( <b>Apply</b> )                |



## CHRIST NAGAR COLLEGE

---

### SEMESTER 2

| COURSE CODE | COURSE NAME                 | COURSE OUTCOME |   |
|-------------|-----------------------------|----------------|---|
| EN1211.4    | ENGLISH FOR CAREER          | CO1            | <b>Recall</b> the grammatical and syntactical rules by solving remedial exercises ( <b>Remember</b> )   |
|             |                             | CO2            | <b>Practice</b> the vocabulary essential for professional communication. ( <b>Apply</b> )   |
|             |                             | CO3            | <b>Analyze</b> passages for comprehension using logical and critical thinking. ( <b>Analyze</b> )   |
|             |                             | CO4            | <b>Test</b> vocabulary, grammar, comprehension, and Remedial English from the perspective of career-oriented tests. ( <b>Evaluate</b> )   |
|             |                             | CO5            | <b>Construct</b> sentences without errors using remedial grammar. ( <b>Create</b> )   |
| MM1231.9    | MATHEMATICS II              | CO1            | <b>Recall</b> set theory concepts, set operations, relations and its operations, equivalence relations and partitions, algebra and functions. ( <b>Remember</b> ).  |
|             |                             | CO2            | <b>Explain</b> formal proofs, methods of proofs (proofs by contradiction, false proof and induction), Boolean expressions, logical equivalence, DeMorgan's law, tautologies, Implications, arguments, fallacies, Normal forms in propositional logic, resolution, partial orders, ordered sets, fractals, grammars, languages, automation and introduction of matlab. ( <b>Understand</b> ) |
|             |                             | CO3            | <b>Illustrate</b> basics of fuzzy set theory, characteristic functions, Warshal's algorithm, recursion, group, ring, polish expressions and hamming codes ( <b>Understand</b> )   |
|             |                             | CO4            | <b>Explain</b> graph notation, topological sort, graph propagation algorithm, depth first and breadth first searches, shortest path algorithms and directed acyclic graphs. ( <b>Apply</b> )  |
|             |                             | CO5            | <b>Analyze</b> graphical representation of functions, graphical interpretation of convergence and complex mapping. ( <b>Analyze</b> )   |
| CP1241      | ENVIRONMENTAL STUDIES       | CO1            | <b>Describe</b> the significance of environmental studies and the conservation of ecosystems and biodiversity ( <b>Understand</b> )   |
|             |                             | CO2            | <b>Explain</b> the sources of environmental pollution and the awareness of environmental laws. ( <b>Understand</b> )  |
|             |                             | CO3            | <b>Describe</b> the significance of human communities, disaster management and environmental ethics. ( <b>Understand</b> )  |
|             |                             | CO4            | <b>Develop</b> case study on environmental issues and its awareness to public. ( <b>Create</b> )  |
|             |                             | CO5            | <b>Develop</b> solutions to maintain sustainable development of the environment. ( <b>Apply</b> )   |
| CP1242      | OBJECT ORIENTED PROGRAMMING | CO1            | <b>Explain</b> the concepts of OOP and the basic structure of C++ programming ( <b>Understand</b> )   |

## CHRIST NAGAR COLLEGE

---

|               |  |     |  |
|---------------|--|-----|--|
|               |  | CO2 | <b>Construct</b> C++ programs using the concept of classes, objects, friend functions, constructors, destructors and operator overloading. <b>(Create)</b> |
|               |  | CO3 | <b>Develop</b> C++ programs using the concept of inheritance and dynamic memory allocation <b>(Apply)</b>  |
|               |  | CO4 | <b>Develop</b> C++ programs using the concept of polymorphism <b>(Apply)</b>   |
|               |  | CO5 | <b>Construct</b> C++ programs using the concept of I/O and file management and exception handling. <b>(Create)</b>   |
| <b>CP1243</b> | <b>DATA STRUCTURES<br/>IN C</b>                | CO1 | <b>Distinguish</b> the different searching and sorting techniques. <b>(Analyze)</b>  |
|               |  | CO2 | <b>Illustrate</b> the static and dynamic implementation of Stack and Queue data structures. <b>(Apply)</b>   |
|               |  | CO3 | <b>Illustrate</b> the memory representation and different operations performed on linked list data structure. <b>(Understand)</b>                          |
|               |  | CO4 | <b>Explain</b> the operations performed on nonlinear data structures such trees and graphs <b>(Understand)</b>   |
|               |  | CO5 | <b>Apply</b> the applications of stack data structure <b>(Apply)</b>   |
| <b>CP1244</b> | <b>OBJECT ORIENTED<br/>PROGRAMMING<br/>LAB</b> | CO1 | <b>Develop</b> programs to demonstrate the use of data types, operators and control structures. <b>(Apply)</b>   |
|               |  | CO2 | <b>Develop</b> programs to demonstrate the use of classes and structures. <b>(Apply)</b>   |
|               |  | CO3 | <b>Devise</b> programs to illustrate the concept of inheritance. <b>(Create)</b>   |
|               |  | CO4 | <b>Devise</b> programs to illustrate the concept of operator overloading and friend functions <b>(Create)</b>  |
|               |  | CO5 | <b>Devise</b> programs to demonstrate the use of early and late binding, file handling and exception handling <b>(Create)</b>                              |
| <b>CP1245</b> | <b>DATA STRUCTURES<br/>IN C LAB</b>            | CO1 | <b>Devise</b> programs to implement different searching and sorting techniques. <b>(Create)</b>  |
|               |  | CO2 | <b>Develop</b> programs to demonstrate the insertion, deletion and searching operations on linked list <b>(Apply)</b>                                      |
|               |  | CO3 | <b>Develop</b> programs to demonstrate the static and dynamic implementation of Stack and Queue. <b>(Apply)</b>  |
|               |  | CO4 | <b>Develop</b> programs to demonstrate the traversal techniques of binary tree and graphs. <b>(Apply)</b>  |
|               |  | CO5 | <b>Develop</b> program to demonstrate the evaluation of expression using Stack data structure <b>(Create)</b>  |

## CHRIST NAGAR COLLEGE

---

### SEMESTER 3

| COURSE CODE    | COURSE NAME                             | COURSE OUTCOME |   |
|----------------|---|----------------|---|
| <b>CP1331</b>  | <b>VALUE EDUCATION</b>                  | CO1            | <b>Demonstrate</b> the concepts of NSS, its activities, Life skills and various youth development programmes ( <b>Apply</b> )                           |
|                |   | CO2            | <b>Explain</b> functions, duties and activities of NCC( <b>Understand</b> )   |
|                |   | CO3            | <b>Explain</b> the concepts of various disasters and its impact( <b>Understand</b> )  |
|                |   | CO4            | <b>Explain</b> various disaster Risk Management ( <b>Understand</b> )   |
|                |   | CO5            | <b>Discuss</b> types of organ donation, its process, procedure and ethical issues( <b>Understand</b> )  |
| <b>CP1341</b>  | <b>COMPUTER NETWORKS &amp; SECURITY</b> | CO1            | <b>Describe</b> about computer networks and data communication ( <b>Understand</b> )  |
|                |   | CO2            | <b>Explain</b> different models and its comparison ( <b>Understand</b> )  |
|                |   | CO3            | <b>Illustrate</b> different techniques for error detection and correction ( <b>Apply</b> )  |
|                |   | CO4            | <b>Determine</b> the different routing algorithms for routing ( <b>Apply</b> )  |
|                |   | CO5            | <b>Explain</b> the concepts of cryptography, authentication systems and various security measures in web, email and network systems. ( <b>Analyze</b> ) |
| <b>CP 1342</b> | <b>OPERATING SYSTEMS</b>                | CO1            | <b>Describe</b> the different types of OS, its components and services and types of system programs. ( <b>Understand</b> )                              |
|                |   | CO2            | <b>Illustrate</b> the process management concepts and its scheduling algorithms. ( <b>Apply</b> )   |
|                |   | CO3            | <b>Demonstrate</b> the different memory management and protection concepts ( <b>Apply</b> )   |
|                |   | CO4            | <b>Illustrate</b> the structure and allocation methods of storage systems and I/O hardware ( <b>Apply</b> ).  |
|                |   | CO5            | <b>Describe</b> IO systems and its specifications( <b>Understand</b> )  |
| <b>CP1343</b>  | <b>DATABASE MANAGEMENT SYSTEMS</b>      | CO1            | <b>Explain</b> the concept of database, relational data model and its operation.( <b>Understand</b> )   |
|                |   | CO2            | <b>Develop</b> skills to design an ER diagram.( <b>Create</b> )   |
|                |   | CO3            | <b>Create</b> database and perform operations using SQL.( <b>Create</b> )   |
|                |   | CO4            | <b>Illustrate</b> functional dependencies ( <b>Apply</b> )  |
|                |   | CO5            | <b>Illustrate</b> normalization procedures in database( <b>Apply</b> )  |
| <b>CP 1344</b> | <b>PROGRAMMING IN JAVA</b>              | CO1            | <b>Describe</b> the java programming and oops concepts( <b>Understand</b> )   |
|                |   | CO2            | <b>Apply</b> the concept of Inheritance, Interface and Packages in Java Programming and solve applications based on these concepts ( <b>Apply</b> )     |



## CHRIST NAGAR COLLEGE

---

|                |                             |     |  |
|----------------|-----------------------------|-----|--|
|                |                             | CO3 | <b>Illustrate</b> the basic concepts of Exception handling, Multithreading and solve applications based on these concepts ( <b>Apply</b> ) |
|                |                             | CO4 | <b>Apply</b> the concept of Java IO packages and solve applications based on this concept( <b>Apply</b> )                                  |
|                |                             | CO5 | <b>Explain</b> the concept of Applet programming, AWT, Swing Controls and JDBC( <b>Analyze</b> )   |
| <b>CP1343</b>  | <b>DBMS LAB</b>             | CO1 | <b>Devise</b> programs to implement database creation and manipulation. ( <b>Create</b> )  |
|                |                             | CO2 | <b>Develop</b> programs to demonstrate aggregate functions in DBMS ( <b>Apply</b> )  |
|                |                             | CO3 | <b>Develop</b> programs to demonstrate join operations ( <b>Apply</b> )  |
|                |                             | CO4 | <b>Develop</b> programs to implement primary key concept. ( <b>Apply</b> )   |
|                |                             | CO5 | <b>Develop</b> programs to implement foreign key concept. ( <b>Apply</b> )   |
| <b>CP 1344</b> | <b>JAVA PROGRAMMING LAB</b> | CO1 | <b>Develop</b> programs to demonstrate the use of control structures( <b>Apply</b> )   |
|                |                             | CO2 | <b>Devise</b> programs to demonstrate the concept of Strings and Classes and Objects( <b>Create</b> )                                      |
|                |                             | CO3 | <b>Devise</b> programs to illustrate the concepts of Inheritance, Interface, Packages and files. ( <b>Create</b> )                         |
|                |                             | CO4 | <b>Devise</b> programs to demonstrate the use of Exception handling, Multithreading, AWT controls and Applets. ( <b>Create</b> )           |
|                |                             | CO5 | <b>Develop</b> programs to illustrate the concept of Applets and AWT controls( <b>Apply</b> )  |

### SEMESTER 4

| <b>COURSE CODE</b> | <b>COURSE NAME</b>                  | <b>COURSE OUTCOME</b> |  |
|--------------------|-------------------------------------|-----------------------|--|
| <b>CP1441</b>      | <b>SOFTWARE ENGINEERING</b>         | CO1                   | <b>Describe</b> the principles of the engineering processes in software development ( <b>Understand</b> )  |
|                    |                                     | CO2                   | <b>Illustrate</b> different project estimation techniques. ( <b>Apply</b> )  |
|                    |                                     | CO3                   | <b>Analyze</b> the requirements for the software projects. ( <b>Analyze</b> )  |
|                    |                                     | CO4                   | <b>Design</b> the requirements of the software projects using function oriented and object-oriented approach. ( <b>Create</b> )                          |
|                    |                                     | CO5                   | <b>Describe</b> the different levels of testing, software quality assurance and maintenance ( <b>Understand</b> )  |
| <b>CP1442</b>      | <b>WEB PROGRAMMING &amp; PYTHON</b> | CO1                   | <b>Understand</b> the basic skills in moderately complex use of the following tools/scripts/languages:HTML, DHTML, CSS, Javascript.( <b>Understand</b> ) |
|                    |                                     | CO2                   | <b>Apply</b> the appropriate web tools/languages for creating state-of-the art websites( <b>Apply</b> )  |

## CHRIST NAGAR COLLEGE

---

|               |                                       |     |  |
|---------------|---------------------------------------|-----|--|
|               |                                       | CO3 | <b>Remember</b> the concepts Of Python programming( <b>Remember</b> )  |
|               |                                       | CO4 | <b>Analyze</b> the concepts of advanced programming using python( <b>Analyze</b> )                                   |
|               |                                       | CO5 | <b>Discuss</b> the concepts of conditional and looping statements( <b>Understand</b> )                               |
| <b>CP1443</b> | <b>PHP &amp;MySQL</b>                 | CO1 | <b>Define</b> features, Operators and the control structures.( <b>Remember</b> )                                     |
|               |                                       | CO2 | <b>Explain</b> arrays and types ( <b>Understand</b> )  |
|               |                                       | CO3 | <b>Explain</b> forms and its components ( <b>Understand</b> )  |
|               |                                       | CO4 | <b>Describe</b> the use of cookies and sessions in a Php. ( <b>Understand</b> )                                      |
|               |                                       | CO5 | <b>Develop</b> skills to write database queries ( <b>Create</b> )  |
| <b>CP1443</b> | <b>DATA MINING &amp; WAREHOUSING</b>  | CO1 | <b>Understand</b> the basic concept of data,knowledge,mining and data preprocessing techniques ( <b>Understand</b> ) |
|               |                                       | CO2 | <b>Recognize</b> data warehouse concept,architecture and business analysis tools( <b>Remember</b> )                  |
|               |                                       | CO3 | <b>Evaluate</b> algorithms for finding hidden and interesting patterns in data( <b>Analyze</b> )                     |
|               |                                       | CO4 | <b>Understand</b> and apply various classification a techniques using tools( <b>Understand</b> )                     |
|               |                                       | CO5 | <b>Understand</b> and apply various clustering and outlier detection techniques using tools( <b>Understand</b> )     |
| <b>CP1445</b> | <b>MINI PROJECT</b>                   | CO1 | <b>Practice</b> the various phases in the SDLC ( <b>Apply</b> )  |
|               |                                       | CO2 | <b>Plan</b> and estimate a project. ( <b>Analyze</b> )   |
|               |                                       | CO3 | <b>Plan</b> time, person and resource management( <b>Analyze</b> )   |
|               |                                       | CO4 | <b>Construct</b> coding and implementation ( <b>Apply</b> )  |
|               |                                       | CO5 | <b>Construct</b> testing and deployment of the software( <b>Apply</b> )  |
| <b>CP1446</b> | <b>PHP &amp;MySQL LAB</b>             | CO1 | <b>Develop</b> Database creation, table creation, insertion, updation, deletion and select. ( <b>Create</b> )        |
|               |                                       | CO2 | <b>Develop</b> Programs to connect PHP and MYSQL( <b>Create</b> )  |
|               |                                       | CO3 | <b>Test</b> WAMP/XAMPP Server Setup or Setup Apache, MySQL and PHP separately in PHP Lab. ( <b>Analyze</b> )         |
|               |                                       | CO4 | <b>Develop</b> php programmes with forms, arrays, functions and strings, session and cookies. ( <b>Create</b> )      |
|               |                                       | CO5 | <b>Develop</b> simple php programs using decision making and loop constructs ( <b>Create</b> )                       |
| <b>CP1447</b> | <b>WEB PROGRAMMING AND PYTHON LAB</b> | CO1 | <b>Devise</b> programs to implements basic concepts of HTML( <b>Create</b> )   |

## CHRIST NAGAR COLLEGE

---

|  |  |     |  |
|--|--|-----|--|
|  |  | CO2 | <b>Develop</b> websites using HTML, DHTML, CSS, Javascript( <b>Apply</b> )                                       |
|  |  | CO3 | <b>Develop</b> programs to demonstrate the use of data types, operators and control structures.( <b>Create</b> ) |
|  |  | CO4 | <b>Devise</b> programs to demonstrate the use of arrays, structures, functions and pointers( <b>Create</b> )     |
|  |  | CO5 | <b>Devise</b> programs to implement the usage of files and library functions. ( <b>Create</b> )                  |

### SEMESTER 5

| COURSE CODE | COURSE NAME                                  | COURSE OUTCOME |   |
|-------------|--|----------------|---|
| CP1541      | DATA ANALYTICS                               | CO1            | <b>Understand</b> the basic concept of data analytics used in practice and its works( <b>Understand</b> )   |
|             |  | CO2            | <b>Understand</b> how data-driven insights can be used for making effective decisions across domains like Marketing, Finance etc.( <b>Understand</b> )                          |
|             |  | CO3            | <b>Identify</b> the correct analytics tool for a specific need and find reliable ways to collect, analyse, visualise and utilise data for decision-making.( <b>Understand</b> ) |
|             |  | CO4            | <b>Employ</b> tips and tricks for Big Data use cases and solutions.( <b>Apply</b> )   |
|             |  | CO5            | <b>Prepare</b> to build and maintain reliable, scalable, distributed systems with Apache Hadoop( <b>Create</b> )  |
| CP1542      | INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT | CO1            | <b>Understand</b> evolution of information and quality ( <b>Understand</b> )  |
|             |  | CO2            | <b>Understand</b> how to handle knowledge ( <b>Understand</b> )   |
|             |  | CO3            | <b>Understand</b> knowledge management and establish a knowledge strategy of framework ( <b>Understand</b> )  |
|             |  | CO4            | <b>Illustrate</b> knowledge management application in organizations ( <b>Understand</b> )   |
|             |  | CO5            | <b>Analyze</b> the role of Knowledge management and application in organization( <b>Analyze</b> )   |
| CP1543      | VISUAL PROGRAMMING                           | CO1            | Describe the basic information about the features of visual studio tools ( <b>Understand</b> )  |
|             |  | CO2            | Illustrate the concept of cascading style sheets (CSS) for designing web pages. ( <b>Apply</b> )  |
|             |  | CO3            | Explain different web server and validation controls ( <b>Apply</b> )   |

## CHRIST NAGAR COLLEGE

---

|               |                               |     |   |
|---------------|-------------------------------|-----|---|
|               |                               | CO4 | Describe state management techniques and its application ( <b>Understand</b> )  |
|               |                               | CO5 | <b>Explain</b> ADO.NET and its implementation ( <b>Apply</b> )  |
| <b>CP1544</b> | <b>SOFTWARE TESTING</b>       | CO1 | <b>Discuss</b> the basic concepts of testing ( <b>Understand</b> )  |
|               |                               | CO2 | <b>Explain</b> the different levels of testing ( <b>Apply</b> )   |
|               |                               | CO3 | <b>Recognize</b> the bugs used in testing( <b>Remember</b> )  |
|               |                               | CO4 | <b>Describe</b> the tools used for testing ( <b>Understand</b> )  |
|               |                               | CO5 | <b>Compute</b> problems related to cyclomatic complexity ( <b>Apply</b> )   |
| <b>CP1545</b> | <b>DATA ANALYTICS LAB</b>     | CO1 | <b>Understand</b> and implement the basics of data preprocessing using NLTK ( <b>Understand</b> )                         |
|               |                               | CO2 | <b>Demonstrate</b> pandas package for statistical analyst ( <b>Analyze</b> )  |
|               |                               | CO3 | <b>Understand</b> dataset analysis using python packages ( <b>Understand</b> )  |
|               |                               | CO4 | <b>Illustrate</b> and apply different visualization methods for given datasets using python packages( <b>Understand</b> ) |
|               |                               | CO5 | <b>Devise</b> program to apply data analytical problems in real life ( <b>Create</b> )                                    |
| <b>CP1546</b> | <b>VISUAL PROGRAMMING LAB</b> | CO1 | <b>Illustrate</b> Visual Studio IDE. ( <b>Understand</b> )  |
|               |                               | CO2 | <b>Design</b> web pages using different web server controls. ( <b>Create</b> )  |
|               |                               | CO3 | <b>Apply</b> CSS, Validation and session management in web applications. ( <b>Apply</b> )                                 |
|               |                               | CO4 | <b>Develop</b> web applications to demonstrate database programming. ( <b>Apply</b> )                                     |
|               |                               | CO5 | <b>Develop</b> web applications to illustrate the use of data bound controls in web pages. ( <b>Apply</b> )               |

### SEMESTER 6

| <b>COURSE CODE</b> | <b>COURSE NAME</b>        | <b>COURSE OUTCOME</b> |  |
|--------------------|---------------------------|-----------------------|--|
| <b>CP1641</b>      | <b>MULTIMEDIA SYSTEMS</b> | CO1                   | <b>Analyze</b> and synthesise the key components of multimedia technologies including text, graphics, voice video and animation ( <b>Analyze</b> ) |
|                    |                           | CO2                   | <b>Define</b> the characteristics of each media type and describe their application ( <b>Remember</b> )  |

## CHRIST NAGAR COLLEGE

---

|               |  |     |  |
|---------------|--|-----|--|
|               |  | CO3 | <b>Analyze</b> the protocols, standards and representation techniques used for storage and transmission of multimedia information ( <b>Analyze</b> ) |
|               |  | CO4 | <b>Evaluate</b> the role of multimedia technologies in the online and web environment ( <b>Evaluate</b> )  |
|               |  | CO5 | <b>Evaluate</b> the role of multimedia technologies in the real life applications ( <b>Evaluate</b> )  |
| <b>CP1642</b> | <b>OBJECT ORIENTED ANALYSIS AND DESIGN</b> | CO1 | <b>Remember</b> object oriented features( <b>Remember</b> )  |
|               |  | CO2 | <b>Understand</b> Object Oriented System Development( <b>Understand</b> )  |
|               |  | CO3 | <b>Apply</b> Unified Approach( <b>Apply</b> )  |
|               |  | CO4 | <b>Analyse</b> various UML diagrams( <b>Analyze</b> )  |
|               |  | CO5 | <b>Evaluate</b> objects static and dynamic model( <b>Evaluate</b> )  |
| <b>CP1643</b> | <b>DESIGN AND ANALYSIS OF ALGORITHMS</b>   | CO1 | <b>Analyze</b> the complexity of algorithms ( <b>Analyze</b> )   |
|               |  | CO2 | <b>Identify</b> good algorithms among multiple solutions for a problem ( <b>Understand</b> )   |
|               |  | CO3 | <b>Evaluate</b> the problems using the suitable algorithm ( <b>Evaluate</b> )  |
|               |  | CO4 | <b>Compare</b> the complexity of different sorting algorithms ( <b>Understand</b> )  |
|               |  | CO5 | <b>Explain</b> the different types of algorithms in terms of polynomial time. ( <b>Understand</b> )  |
| <b>CP1661</b> | <b>ENTREPRENEURSHIP DEVELOPMENT</b>        | CO1 | <b>Adapt</b> the students to have a practical insight for becoming an entrepreneur. ( <b>Create</b> )  |
|               |  | CO2 | <b>Describe</b> the students with the latest programs of the government authorities in promoting small and medium industries. ( <b>Understand</b> )  |
|               |  | CO3 | <b>Illustrate</b> knowledge regarding how to start new ventures ( <b>Apply</b> )   |
|               |  | CO4 | <b>Classify</b> the various sources of business finance and identify different institutions that support entrepreneurs. ( <b>Analyze</b> )           |
|               |  | CO5 | <b>Describe</b> the concept of entrepreneurship and its role in economic development ( <b>Understand</b> )   |
| <b>CP1644</b> | <b>TRENDS IN COMPUTING</b>                 | CO1 | <b>Analyze</b> the working cloud computing ( <b>Analyze</b> )  |
|               |  | CO2 | <b>Understand</b> the advantage and need of cloud storage( <b>Understand</b> )   |

## CHRIST NAGAR COLLEGE

---

|  |  |     |   |
|--|--|-----|---|
|  |  | CO3 | <b>Evaluate</b> the advanced technologies( <b>Evaluate</b> )                            |
|  |  | CO4 | <b>Understand</b> the need of fuzzy sets and neural network( <b>Understand</b> )        |
|  |  | CO5 | <b>Identify</b> the problem area of neural networks and fuzzy logics( <b>Remember</b> ) |

### MSC COMPUTER SCIENCE

#### SEMESTER 1

| COURSE CODE | COURSE NAME                                  | COURSE OUTCOME |  |
|-------------|--|----------------|--|
| CS1611      | COMPUTER ARCHITECTURE                        | CO1            | <b>Describe</b> the basic hardware components of computer system ( <b>Remember</b> )   |
|             |  | CO2            | <b>Demonstrate</b> the concept of Microprocessors, instruction set, CISC and RISC Architectures ( <b>Apply</b> )   |
|             |  | CO3            | <b>Illustrate</b> memory organization and input/output organization ( <b>Understand</b> )  |
|             |  | CO4            | <b>Illustrate</b> non-linear pipeline processors ( <b>Understand</b> )   |
|             |  | CO5            | <b>Describe</b> the basic hardware components of computer system ( <b>Remember</b> )   |
| CS1612      | DATA STRUCTURES AND ALGORITHMS               | CO1            | <b>Develop</b> efficient algorithms and analysis its complexity levels ( <b>Apply</b> )  |
|             |  | CO2            | <b>Understand</b> advanced tree structures and graph algorithms for the design of efficient algorithms suitable for solving advanced computational problems ( <b>Understand</b> ).   |
|             |  | CO3            | <b>Devise</b> deterministic and non-deterministic algorithms( <b>Apply</b> )   |
|             |  | CO4            | <b>Apply</b> algorithm design concept such as divide and conquer, greedy methods for solving different problems ( <b>Apply</b> )   |
|             |  | CO5            | <b>Apply</b> algorithm design concept such as dynamic programming, backtracking and branch and bound ( <b>Apply</b> )  |
| CS1612      | MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE | CO1            | <b>Define</b> Sets, Subsets, sequence, Functions, partitions, Functions for computer science, Permutation Functions, Subgroups, Monoids, Symmetric groups, Groups homomorphism and isomorphism, Cosets, Circuits. Spanning tree and Probability with example.. ( <b>Remember and understand</b> ). |
|             |  | CO2            | <b>State</b> Lagrange's Theorem, Burnside's theorem, Baye's theorem, Axioms of probability, Lattices, Finite Boolean algebra( <b>Apply</b> )   |



## CHRIST NAGAR COLLEGE

---

|               |   |     |   |
|---------------|---|-----|---|
|               |   | CO3 | <b>Solve</b> problems based on operations on sets, product sets, Permutation of groups, Partially ordered sets, Normal subgroups, conditional probability and Contrast Inclusion-Exclusion principle, Pigeonhole Principle, Differentiate Euler and Hamiltonian graphs and Groups and Semigroups. ( <b>Analyze</b> and <b>Apply</b> ) |
|               |   | CO4 | <b>Summarise</b> Relations, Mathematics Logic- Statements and Notation, Connectives ,Normal Forms, The Theory of Interface for the statement Calculus, Inference Theory of the Predicate Calculus , and Basic Concept of Graph Theory. ( <b>Evaluate</b> )  |
|               |   | CO5 | <b>Combine</b> Growth of Functions, Finite –State Machines: Languages, representation of special grammars and languages, Finite state machines and properties of relations. ( <b>Create</b> ).  |
| <b>CS1614</b> | <b>PROGRAMMING PARADIGMS</b>              | CO1 | <b>Explain</b> the characteristics and design principles of different Programming languages( <b>Understand</b> )  |
|               |   | CO2 | <b>Demonstrate</b> the concept of OOP in C++ ( <b>Understand</b> )  |
|               |   | CO3 | <b>Apply</b> the concepts of packages and inheritance, in Java( <b>Apply</b> )  |
|               |   | CO4 | <b>Apply</b> the concepts of Multithreading and Exception handling mechanisms in Java( <b>Apply</b> )   |
|               |   | CO5 | <b>Apply</b> the concepts of languages like HTML, XML, CSS, JavaScript and Servlets( <b>Apply</b> )   |
| <b>CS1615</b> | <b>COMPUTER NETWORKS</b>                  | CO1 | <b>Describe</b> the components of data communication , network reference models and interconnecting devices( <b>Understand</b> )  |
|               |   | CO2 | <b>Discuss</b> the concept of mobile communication ,telecommunication systems and wireless LAN ( <b>Understand</b> )  |
|               |   | CO3 | <b>Describe</b> the concepts of mobile IP ,Wireless Application Protocol , and wireless sensor networks ( <b>Understand</b> )   |
|               |   | CO4 | <b>Describe</b> the concepts of wireless sensor networks ( <b>Understand</b> )  |
|               |   | CO5 | <b>Describe</b> the concepts of IOT systems( <b>Understand</b> )  |
| <b>CS1616</b> | <b>DATA STRUCTURES AND ALGORITHMS LAB</b> | CO1 | <b>Develop</b> a program to implement various data structure concepts ( <b>Create</b> )   |
|               |   | CO2 | <b>Devise</b> programs to demonstrate the use of linked list, trees and graph ( <b>Create</b> )   |
|               |   | CO3 | <b>Apply</b> the concept of data structures in real time applications ( <b>Apply</b> )  |
|               |   | CO4 | <b>Create</b> case study reports in various applications using algorithms( <b>Create</b> )  |
|               |   | CO5 | <b>Distinguish</b> various algorithms based on complexity estimation( <b>Analyze</b> )  |

## CHRIST NAGAR COLLEGE

---

|               |                             |     |  |
|---------------|-----------------------------|-----|--|
| <b>CS1617</b> | <b>JAVA PROGRAMMING LAB</b> | CO1 | <b>Develop</b> programs to demonstrate the various concepts of object oriented programming in Java( <b>Apply</b> ) |
|               |                             | CO2 | <b>Devise</b> programs to demonstrate the concepts of Applet, AWT and JDBC( <b>Create</b> )                        |
|               |                             | CO3 | <b>Develop</b> GUI applications using Java( <b>Apply</b> )   |
|               |                             | CO4 | <b>Develop</b> programs to demonstrate Java IO operations( <b>Apply</b> )  |
|               |                             | CO5 | <b>Devise</b> programs to demonstrate the concept of Inheritance and Interfaces( <b>Create</b> )                   |

### SEMESTER 2

| <b>COURSE CODE</b> | <b>COURSE NAME</b>                         | <b>COURSE OUTCOME</b> |  |
|--------------------|--|-----------------------|--|
| <b>CS1621</b>      | <b>MODERN OPERATING SYSTEMS</b>            | CO1                   | <b>Define</b> the different types, components and services of an Operating System software. ( <b>Remember</b> )  |
|                    |  | CO2                   | <b>Describe</b> various process types, scheduling algorithms, process synchronization and handling of deadlock situation. ( <b>Understand</b> )            |
|                    |  | CO3                   | <b>Explain</b> the different approaches to memory management. ( <b>Understand</b> )  |
|                    |  | CO4                   | <b>Discuss</b> the structure, organization and allocation methods of File System and I/O System with the implementation in Linux OS. ( <b>Understand</b> ) |
|                    |  | CO5                   | <b>Describe</b> various security and protection methods( <b>Understand</b> )   |
| <b>CS1622</b>      | <b>ADVANCES IN DATABASE MANAGEMENT</b>     | CO1                   | <b>Discuss</b> the basics of Database Management Systems and its relational model ( <b>Understand</b> )  |
|                    |  | CO2                   | <b>Develop</b> Entity-Relationship data model based on its concept and extended features ( <b>Apply</b> )  |
|                    |  | CO3                   | <b>Explain</b> the concept of Object Oriented Database Management Systems ( <b>Understand</b> )  |
|                    |  | CO4                   | <b>Explain</b> the concept of Distributed Database Management Systems and its architecture and functions ( <b>Understand</b> )                             |
|                    |  | CO5                   | <b>Explain</b> the concept of transaction protocols( <b>Understand</b> )   |
| <b>CS 1623</b>     | <b>OBJECT ORIENTED ANALYSIS AND DESIGN</b> | CO1                   | <b>Illustrate</b> the concepts of Object Oriented Analysis and Design. ( <b>Understand</b> )   |
|                    |  | CO2                   | <b>Develop</b> various UML diagrams based on the concepts of Object Oriented Analysis and Design ( <b>Create</b> )   |

## CHRIST NAGAR COLLEGE

---

|               |   |     |  |
|---------------|---|-----|--|
|               |   | CO3 | <b>Discuss</b> the concepts of Object oriented Analysis process and Design process ( <b>Understand</b> )   |
|               |   | CO4 | <b>Explain</b> software implementation and object oriented testing ( <b>Understand</b> )   |
|               |   | CO5 | <b>Develop</b> software applications using OOAD concept( <b>Create</b> )   |
| <b>CS1624</b> | <b>GRAPHICS &amp; MULTIMEDIA SYSTEMS</b>  | CO1 | <b>Illustrate</b> line (DDA, Bresenhams) and circle drawing algorithms.( <b>Understand</b> )   |
|               |   | CO2 | <b>Solve</b> problems related to transformations, Clipping. ( <b>Apply</b> )   |
|               |   | CO3 | <b>Explain</b> multimedia system architecture and data compression techniques. ( <b>Understand</b> )   |
|               |   | CO4 | <b>Explain</b> 3D concepts ( <b>Understand</b> )   |
|               |   | CO5 | <b>Discuss</b> the basics of animation( <b>Understand</b> )  |
| <b>CS1625</b> | <b>OPTIMIZATION TECHNIQUES</b>            | CO1 | <b>Identify</b> the scope and way in which LPP, dual LPP, Transportation Problem and Assignment Models are formulated. ( <b>Understand</b> )   |
|               |   | CO2 | <b>Illustrate</b> LPP using Simplex method and Big-M method. ( <b>Apply</b> )  |
|               |   | CO3 | <b>Illustrate</b> Transportation Problem by North West Corner rule, least cost method and Vogel's approximation method and also Assignment Problem by Hungarian Method. ( <b>Apply</b> ) |
|               |   | CO4 | <b>Explain</b> Network models, CPM & Pert, Queues and Queuing System ( <b>Apply</b> )  |
|               |   | CO5 | <b>Explain</b> travelling salesman problem, game theory, method of optimal strategies and rectangular games. ( <b>Analyze</b> )  |
| <b>CS1626</b> | <b>MINOR PROJECT &amp; SEMINAR</b>        | CO1 | <b>Develop</b> the skill of problem identification, methodology and solution to socially useful applications.( <b>Create</b> )   |
|               |   | CO2 | <b>Develop</b> a structured documentation for the implemented software application ( <b>Create</b> )   |
|               |   | CO3 | <b>Summarize</b> on current and emerging topics in computer science( <b>Evaluate</b> )   |
|               |   | CO4 | <b>Plan</b> time, person and resource management( <b>Analyze</b> )   |
|               |   | CO5 | <b>Construct</b> coding and implementation ( <b>Apply</b> )  |
| <b>CS1627</b> | <b>DATABASE &amp; WEB PROGRAMMING LAB</b> | CO1 | <b>Develop</b> Database creation, table creation, insertion, updation, deletion and select. ( <b>Create</b> )  |
|               |   | CO2 | <b>Develop</b> Programs to connect PHP and MYSQL( <b>Create</b> )  |
|               |   | CO3 | <b>Design</b> responsive web pages using scripting languages and tools( <b>Create</b> )  |
|               |   | CO4 | <b>Design</b> web application with database content and dynamic operations ( <b>Create</b> )   |
|               |   | CO5 | <b>Design</b> real life problems using database and mining concepts ( <b>Create</b> )  |

## CHRIST NAGAR COLLEGE

---

### SEMESTER 3

| COURSE CODE | COURSE NAME                           | COURSE OUTCOME |  |
|-------------|---------------------------------------|----------------|--|
| CS1631      | DATA MINING AND WAREHOUSING           | CO1            | <b>Discuss</b> types of data objects and basic statistical description of data( <b>Understand</b> )                    |
|             |                                       | CO2            | <b>Distinguish</b> the different types of data visualization and data pre- processing techniques.( <b>Understand</b> ) |
|             |                                       | CO3            | <b>Explain</b> the concepts of data warehousing and its different models. ( <b>Understand</b> )                        |
|             |                                       | CO4            | <b>Compare</b> the different techniques used for classification. ( <b>Analyze</b> )                                    |
|             |                                       | CO5            | <b>Analyze</b> the different methods used for cluster analysis( <b>Analyze</b> )                                       |
| CS 1632     | DISTRIBUTED SYSTEMS & CLOUD COMPUTING | CO1            | <b>Describe</b> the characteristics of distributed systems and its various models ( <b>Remember</b> )                  |
|             |                                       | CO2            | <b>Illustrate</b> the distributed file system and its architecture ( <b>Understand</b> )                               |
|             |                                       | CO3            | <b>Describe</b> transactions and concurrency control in distributed systems ( <b>Remember</b> )                        |
|             |                                       | CO4            | <b>Illustrate</b> cloud computing, the components and data storage in cloud ( <b>Understand</b> )                      |
|             |                                       | CO5            | <b>Explain</b> the concept of Service Oriented Architecture ( <b>Understand</b> )                                      |
| CS1633      | INFORMATION SECURITY                  | CO1            | <b>Compare</b> various types of cryptography algorithms ( <b>Analyze</b> )   |
|             |                                       | CO2            | <b>Explain</b> the different authentication and authorization methods used in Cryptography System ( <b>Apply</b> )     |
|             |                                       | CO3            | <b>Describe</b> various authentication protocols and world security protocols ( <b>Understand</b> )                    |
|             |                                       | CO4            | <b>Explain</b> various software flaws and malwares and the concept of digital watermarking ( <b>Understand</b> )       |
|             |                                       | CO5            | <b>Describe</b> the basic components and terminologies of information system ( <b>Remember</b> )                       |
| CS1634      | COMPILER DESIGN                       | CO1            | <b>Summarize</b> various system utilities and 8085 architecture. ( <b>Understand</b> )                                 |
|             |                                       | CO2            | <b>Describe</b> the basics of compiler structures. ( <b>Remember</b> )   |
|             |                                       | CO3            | <b>Formulate</b> the compiler design concepts and automata ( <b>Create</b> )   |
|             |                                       | CO4            | <b>Construct</b> Context Free Grammars.( <b>Create</b> )   |
|             |                                       | CO5            | <b>Construct</b> Pushdown automata( <b>Create</b> )  |
| CS1635C     | MACHINE INTELLIGENCE                  | CO1            | <b>Explain</b> the basic concepts and representation of knowledge ( <b>Understand</b> )                                |
|             |                                       | CO2            | <b>Apply</b> the different techniques and search methods in AI ( <b>Analyze</b> )                                      |

## CHRIST NAGAR COLLEGE

---

|                |                                   |     |   |
|----------------|-----------------------------------|-----|---|
|                |                                   | CO3 | <b>Discuss</b> the characteristics of expert system and its applications ( <b>Understand</b> )                                |
|                |                                   | CO4 | <b>Summarize</b> the various reasoning methods and natural language processing approaches( <b>Evaluate</b> )                  |
|                |                                   | CO5 | <b>Discuss</b> the various natural language processing approaches( <b>Understand</b> )  |
| <b>CS1637</b>  | <b>DISTRIBUTED COMPUTING LAB</b>  | CO1 | <b>Construct</b> programs on RMI and RPC( <b>Apply</b> )  |
|                |                                   | CO2 | <b>Construct</b> programs on TCP, FTP and UDP( <b>Apply</b> )   |
|                |                                   | CO3 | <b>Develop</b> socket programs and client server applications( <b>Apply</b> )   |
|                |                                   | CO4 | <b>Devise</b> programs on Cloud Storage( <b>Analyze</b> )   |
|                |                                   | CO5 | <b>Develop</b> the basic concepts of Hadoop( <b>Apply</b> )   |
| <b>CS 1636</b> | <b>NETWORK ADMINISTRATION LAB</b> | CO1 | <b>Evaluate</b> various Linux commands for Linux administration, configuration and managing user accounts ( <b>Evaluate</b> ) |
|                |                                   | CO2 | <b>Experiment</b> network configuration, its types and communication methods ( <b>Apply</b> )                                 |
|                |                                   | CO3 | <b>Apply</b> network commands ( <b>Apply</b> )  |
|                |                                   | CO4 | <b>Experiment</b> network using Packet Tracer Software( <b>Apply</b> )  |
|                |                                   | CO5 | <b>Apply</b> configuration of servers -telnet,ftp,dhcp,nfs( <b>Apply</b> )  |

### SEMESTER 4

| <b>COURSE CODE</b> | <b>COURSE NAME</b>                    | <b>COURSE OUTCOME</b> |   |
|--------------------|---------------------------------------|-----------------------|---|
| <b>CS1641</b>      | <b>RESEARCH AND TECHNICAL WRITING</b> | CO1                   | <b>Explain</b> various research types,objectives and scientific method of solving the research problems( <b>Understand</b> )                        |
|                    |                                       | CO2                   | <b>Create</b> articles, books,reports and slides using LaTeX( <b>Create</b> )   |
|                    |                                       | CO3                   | <b>Create</b> presentations using Beamer( <b>Create</b> )   |
|                    |                                       | CO4                   | <b>Practice</b> the basic programming and object oriented concepts of python language ( <b>Apply</b> )  |
|                    |                                       | CO5                   | <b>Illustrate</b> the database connectivity in python programming. ( <b>Understand</b> )  |
| <b>CS1642D</b>     | <b>EMBEDDED SYSTEMS</b>               | CO1                   | <b>Explain</b> the key concepts of embedded systems such as I/O, timers, interrupts, and interaction with peripheral devices. ( <b>Understand</b> ) |

---

## CHRIST NAGAR COLLEGE

---

|               |                      |     |   |
|---------------|----------------------|-----|---|
|               |                      | CO2 | <b>Reproduce</b> the programming concepts in Assembly level programming language and High-level programming language. <b>(Remember)</b> |
|               |                      | CO3 | <b>Describe</b> the concept of multiple processes, threads, tasks in the operating system <b>(Remember)</b>                             |
|               |                      | CO4 | <b>Explain</b> the functions related to OS <b>(Understand)</b>  |
|               |                      | CO5 | <b>Describe</b> RTOS and its services, management, and security issues <b>(Understand)</b>  |
| <b>CS1643</b> | <b>MAJOR PROJECT</b> | CO1 | <b>Prepare</b> a proposal and synopsis of the topic. <b>(Create)</b>  |
|               |                      | CO2 | <b>Develop</b> various SDLC phases <b>(Create)</b>  |
|               |                      | CO3 | <b>Plan</b> and estimate project <b>(Analyze)</b>   |
|               |                      | CO4 | <b>Prepare</b> coding, testing and maintenance phase of the project <b>(Create)</b>   |
|               |                      | CO5 | <b>Prepare</b> the testing phase and deployment of the application <b>(Create)</b>  |