



# Indra Ganesan

## COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai  
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC

IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

# NAAC DOCUMENTS

## QUALITY INDICATOR FRAME WORK

### CRITERION – 2

## TEACHING-LEARNING AND EVALUATION

SUBMITTED BY

# IQAC

INTERNAL QUALITY ASSURANCE CELL  
INDRA GANESAN COLLEGE OF ENGINEERING





**Indra Ganesan**  
**COLLEGE OF ENGINEERING**  
Madurai Main Road (NH-45B), Manikandam, Tiruchirappalli - 620 012  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai  
NAAC Accredited, 2(F) Status Institution by UGC



<b>Criteria 2</b>	<b>Teaching-Learning and Evaluation</b>	<b>350</b>
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### **Key Indicator-2.6 Student Performances and Learning Outcome (90)**

**2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all programmes offered by the institution are stated and displayed on website**

**DEPARTMENT OF COMPUTER SCIENCE RG-2021**

**INDRA GANESAN COLLEGE OF ENGINEERING**  
**IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India**  
**(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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**REGULATION -2021**

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

The Students will be able to

1. Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.
2. Strong theoretical foundation leading to excellence and excitement towards research, to provide elegant solutions to complex problems.
3. Ability to work effectively with various engineering fields as a team to design, build and develop system applications.



**Dr. G. Balakrishnan, M.E., Ph.D.,**  
**Principal**  
**Indra Ganesan College of Engineering**  
**IG Valley, Madurai Main Road**  
**Manikandam, Trichy-620 012.**

## COURSE OUTCOMES


### C106- GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C106.1	Demonstrate the logical solutions through Flowcharts, Algorithms and Pseudo code.	1,2,3,4,10,11,12	1,2,3
C106.2	Explain the syntax for python programming constructs	1,2,3,4,10,11,12	1,2,3
C106.3	Compute the flow of the program to obtain the programmatic solution	1,2,3,4,10,11,12	1,2,3
C106.4	Examine the programs with sub problems using 'Python' language.	1,2,3,4,10,11,12	1,2,3
C106.5	Compute the compound data using Python lists, tuples, and dictionaries	1,2,3,4,10,11,12	1,2,3
C106.6	Apply python programs to read and write data from/to files	1,2,3,4,10,11,12	1,2,3

#### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C106.1	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1
C106.2	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1
C106.3	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1
C106.4	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1
C106.5	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1
C106.6	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1
C106	3	3	2	1	-	-	-	-	-	2	2	1	3	3	1

  
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## C108- GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING LAB

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C108.1	Demonstrate the logical solutions through Flowcharts, Algorithms and Pseudo code.	1,2,3,4,5,9,10,11,12	1,2,3
C108.2	Apply the concept of conditionals and loops in Python programs	1,2,3,4,5,9,10,11,12	1,2,3
C108.3	Compute the flow of the program to obtain the programmatic solution	1,2,3,4,5,9,10,11,12	1,2,3
C108.4	Examine the programs with sub problems using 'Python' language.	1,2,3,4,5,9,10,11,12	1,2,3
C108.5	Compute the compound data using Python lists, tuples, and dictionaries	1,2,3,4,5,9,10,11,12	1,2,3
C108.6	Interpret the findings with appropriate technological / research citation	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C108.1	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1
C108.2	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1
C108.3	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1
C108.4	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1
C108.5	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1
C108.6	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1
<b>C108</b>	3	3	2	2	2	-	-	-	2	2	1	1	3	2	1

  
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### SEM –III

#### **C202-CS3351 DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION**

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C202.1	Design various combinational digital circuits using logic	1,2,3,4,5,9,10,11,12	1,2,3
C202.2	Design sequential circuits and analyze the design procedures	1,2,3,4,5,9,10,11,12	1,2,3
C202.3	State the fundamentals of computer systems and analyze the execution of an instruction	1,2,3,4,5,9,10,11,12	1,2,3
C202.4	Analyze different types of control design and identify hazards	1,2,3,4,5,9,10,11,12	1,2,3
C202.5	Identify the characteristics of various memory systems and I/O communication	1,2,3,4,5,9,10,11,12	1,2,3
C202.6	Design of data path unit, control unit for processor and to familiarize with the hazards.	1,2,3,4,5,9,10,11,12	1,2,3

#### **Mapping of COs, POs with PSOs**

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C202.1	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
C202.2	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
C202.3	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
C202.4	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
C202.5	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
C202.6	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1
C202	3	3	3	3	2	2	1	1	1	1	2	3	2	3	1

  
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## C203-CS3352 FOUNDATIONS OF DATA SCIENCE

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C203.1	Explain the data science process and the basic concept of data science fundamentals	1,2,3,4,5,9,10,11,12	1,2,3
C203.2	Illustrate to convert the values from the normal distribution into z scores using data with tables, graphs, averages, and variability	1,2,3,4,5,9,10,11,12	1,2,3
C203.3	Examine the data to describe the relationship by examining the form, direction, and strength of the association by quantitatively and qualitatively.	1,2,3,4,5,9,10,11,12	1,2,3
C203.4	Examine the Numpy libraries to perform a wide variety of high-level mathematical functions that operate on the arrays and matrices.	1,2,3,4,5,9,10,11,12	1,2,3
C203.5	Examine the Pandas libraries for analyzing, cleaning, exploring, and manipulating data.	1,2,3,4,5,9,10,11,12	1,2,3
C203.6	Explain the visualization libraries in Python to identify patterns, trends, and outliers in large data sets along with its libraries, graphs, charts, and histogram	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C203.1	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1
C203.2	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1
C203.3	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1
C203.4	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1
C203.5	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1
C203.6	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1
<b>C203</b>	2	2	2	2	2	-	-	-	2	2	2	2	3	2	1

  
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## C204- CS3301 DATA STRUCTURES

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C204.1	Define linear and non-linear data structures.	1,2,3,4,5,9,10,11,12	1,2,3
C204.2	Implement linear and non-linear data structure operations.	1,2,3,4,5,9,10,11,12	1,2,3
C204.3	Use appropriate linear data structure operations for solving a given problem.	1,2,3,4,5,9,10,11,12	1,2,3
C204.4	Use appropriate non-linear data structure trees and its application	1,2,3,4,5,9,10,11,12	1,2,3
C204.5	Apply appropriate graph algorithms for graph applications.	1,2,3,4,5,9,10,11,12	1,2,3
C204.6	Analyze the various searching and sorting algorithms.	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C204.1	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1
C204.2	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1
C204.3	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1
C204.4	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1
C204.5	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1
C204.6	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1
C204	3	3	3	3	2	-	-	-	1	1	2	3	2	3	1

  
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## C205- CS3391 OBJECT ORIENTED PROGRAMMING

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C205.1	Apply the concepts of classes and objects to solve simple problems	1,2,3,4,5,9,10,11,12	1
C205.2	Develop programs using inheritance, packages and interfaces	1,2,3,4,5,9,10,11,12	1
C205.3	Make use of exception handling mechanisms and multithreaded model to solve real world problems	1,2,3,4,5,9,10,11,12	1
C205.4	Build Java applications with I/O packages, string classes, Collections and generics concepts	1,2,3,4,5,9,10,11,12	1
C205.5	Integrate the concepts of event handling and JavaFX components and controls	1,2,3,4,5,9,10,11,12	1
C205.6	Develop GUI based applications		

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C205.1	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1
C205.2	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1
C205.3	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1
C205.4	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1
C205.5	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1
C205.6	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1
C205	3	2	2	2	2	-	-	-	2	2	2	2	3	1	1

  
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## C206- CS3311 DATA STRUCTURES LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C206.1	Demonstrate array implementation of linear data structure algorithms	1,2,3,4,5,9,10,11,12	1,2,3
C206.2	Implement the applications using Linked list	1,2,3,4,5,9,10,11,12	1,2,3
C206.3	Use appropriate linear data structure operations for solving a given problem.	1,2,3,4,5,9,10,11,12	1,2,3
C206.4	Use appropriate non-linear data structure trees and its application	1,2,3,4,5,9,10,11,12	1,2,3
C206.5	Apply appropriate graph algorithms for graph applications.	1,2,3,4,5,9,10,11,12	1,2,3
C206.6	Analyze the various searching and sorting algorithms.	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C206.1	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1
C206.2	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1
C206.3	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1
C206.4	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1
C206.5	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1
C206.6	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1
C206	3	2	2	2	1	-	-	-	2	1	2	3	2	2	1



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## C207- CS3381 OBJECT ORIENTED PROGRAMMING LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C207.1	Develop and implement Java programs for simple applications that make use of classes	1,2,3,4,5,9,10,11,12	1,2,3
C207.2	Develop simple applications using object-oriented concepts such as package, exceptions	1,2,3,4,5,9,10,11,12	1,2,3
C207.3	Develop and implement Java programs with array list	1,2,3,4,5,9,10,11,12	1,2,3
C207.4	Develop applications using generic programming and event handling	1,2,3,4,5,9,10,11,12	1,2,3
C207.5	Implement and deploy web applications using Java	1,2,3,4,5,9,10,11,12	1,2,3
C207.6	Design applications using file processing	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C207.1	2	1	1	1	1	-	-	-	2	2	2	2	3	2	2
C207.2	2	1	1	1	1	-	-	-	2	2	2	2	3	2	2
C207.3	2	1	1	1	1	-	-	-	2	2	2	2	3	2	2
C207.4	2	1	1	1	1	-	-	-	2	2	2	2	3	2	2
C207.5	2	1	1	1	1	-	-	-	2	2	2	2	3	2	2
C207.6	2	1	1	1	1				2	2	2	2	3	2	2
C207	2	1	1	1	1	-	-	-	2	2	2	2	3	2	2

  
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## C208- CS3361 DATA SCIENCE LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C208.1	Make use of the python libraries for data science	1,2,3,4,5,9,10,11,12	1,2,3
C208.2	Make use of the basic Statistical and Probability measures for data science.	1,2,3,4,5,9,10,11,12	1,2,3
C208.3	Perform descriptive analytics on the benchmark data sets.	1,2,3,4,5,9,10,11,12	1,2,3
C208.4	Perform correlation on standard data sets	1,2,3,4,5,9,10,11,12	1,2,3
C208.5	Perform regression analytics on standard data sets	1,2,3,4,5,9,10,11,12	1,2,3
C208.6	Present and interpret data using visualization packages in Python.	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C208.1	3	3	2	1	1	-	-	-	1	2	2	2	3	2	1
C208.2	3	3	2	1	1	-	-	-	1	2	2	2	3	2	1
C208.3	3	3	2	1	1	-	-	-	1	2	2	2	3	2	1
C208.4	3	3	2	1	1	-	-	-	1	2	2	2	3	2	1
C208.5	3	3	2	1	1	-	-	-	1	2	2	2	3	2	1
C208.6	3	3	2	1	1				1	2	2	2	3	2	1
C208	3	3	2	1	1	-	-	-	1	2	2	2	3	2	1

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**SEM –IV**

**C210- CS3452 THEORY OF COMPUTATION**

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C210.1	Discuss the different kinds of proof and construct automata for any pattern.	1,2,3,4,10,11,12	1,2,3
C210.2	Design Turing machines for any language and propose computation solutions.	1,2,3,4,10,11,12	1,2,3
C210.3	Construct regular expression for any pattern and find minimization of automata.	1,2,3,4,10,11,12	1,2,3
C210.4	Illustrate the concept of automata, regular expression for any pattern to get the specified transition diagram.	1,2,3,4,10,11,12	1,2,3
C210.5	Discuss decidable and undecidable problems, solvable and unsolvable problems to solve the NP complete.	1,2,3,4,10,11,12	1,2,3
C210.6	Demonstrate Context free grammar for any construct and to design the parse tree for the given grammar.	1,2,3,4,10,11,12	1,2,3

**Mapping of COs, POs with PSOs**

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C210.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C210.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C210.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C210.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C210.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C210	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1



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## C211- CS3491 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C211.1	Use appropriate search algorithms for problem solving	1,2,3,4,10,11,12	1,2,3
C211.2	Use appropriate search algorithms for any AI problem	1,2,3,4,10,11,12	1,2,3
C211.3	Apply reasoning under uncertainty	1,2,3,4,10,11,12	1,2,3
C211.4	Build supervised learning models	1,2,3,4,10,11,12	1,2,3
C211.5	Build ensembling and unsupervised models	1,2,3,4,10,11,12	1,2,3
C211.6	Build deep learning neural network models	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C211.1	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1
C211.2	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1
C211.3	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1
C211.4	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1
C211.5	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1
C211.6	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1
C211	3	3	2	1	-	-	-	-	-	2	1	1	3	2	1

  
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## C212- CS3492 DATABASE MANAGEMENT SYSTEMS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C212.1	Draw ER diagrams from relational model using the fundamental concepts.	1,2,3,4,10,11,12	1,2,3
C212.2	Examine the advanced concepts of security in databases systems.	1,2,3,4,10,11,12	1,2,3
C212.3	Discuss the concepts of transaction processing and concurrency control.	1,2,3,4,10,11,12	1,2,3
C212.4	Describe the fundamental concepts of relational database and SQL.	1,2,3,4,10,11,12	1,2,3
C212.5	Summarize the information retrieval process for the distributed database	1,2,3,4,10,11,12	1,2,3
C212.6	Distinguish various indexing and hashing strategies in different database systems.	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C212.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C212.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C212.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C212.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C212.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C212.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C212	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1

  
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## C213 - C304- CS3401 ALGORITHMS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C213.1	Analyze the efficiency of algorithms using various frameworks	1,2,3,4,10,11,12	1,2,3
C213.2	Apply the algorithm analysis techniques on searching and sorting algorithms	1,2,3,4,10,11,12	1,2,3
C213.3	Apply graph algorithms to solve problems and analyze their efficiency.	1,2,3,4,10,11,12	1,2,3
C213.4	Make use of algorithm design techniques like divide and conquer, dynamic programming and greedy techniques to solve problems	1,2,3,4,10,11,12	1,2,3
C213.5	Use the state space tree method for solving problems.	1,2,3,4,10,11,12	1,2,3
C213.6	Solve problems using approximation algorithms and randomized algorithms	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C213.1	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1
C213.2	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1
C213.3	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1
C213.4	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1
C213.5	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1
C213.6	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1
C213	3	2	2	2	-	-	-	-	-	2	2	1	2	2	1



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## C214-CS3451 INTRODUCTION TO OPERATING SYSTEMS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C214.1	Implement administrative tasks on Linux servers.	1,2,3,4,10,11,12	1,2,3
C214.2	Explain the basic elements of a computer system and an operating system	1,2,3,4,10,11,12	1,2,3
C214.3	Demonstrate the administrative tasks on Linux Servers and compare the features of Android and iOS.	1,2,3,4,10,11,12	1,2,3
C214.4	Compare the memory management techniques for 32 and 64-bit architectures.	1,2,3,4,10,11,12	1,2,3
C214.5	Encapsulate the concepts of Mass Storage Structure, File System Structure and I/O Systems.	1,2,3,4,10,11,12	1,2,3
C214.6	Illustrate the operating system basic concepts, System call, structure and its functionalities.	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C214.1	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1
C214.2	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1
C214.3	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1
C214.4	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1
C214.5	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1
C214.6	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1
C214	3	3	2	2	-	-	-	-	-	2	1	1	3	2	1

  
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## C215- GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C215.1	Recognize and illustrate the functions of environment, ecosystems and biodiversity and their conservation.	1,2,3,4,5,10,11,12	1,2,3
C215.2	Identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	1,2,3,4,5,10,11,12	1,2,3
C215.3	Identify and apply the renewable and non-renewable resources content and	1,2,3,4,5,10,11,12	1,2,3
C215.4	Contribute to the sustainable measures to preserve them for future generations.	1,2,3,4,5,10,11,12	1,2,3
C215.5	Recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	1,2,3,4,5,10,11,12	1,2,3
C215.6	Demonstrate and discuss the sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	1,2,3,4,5,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C215.1	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1
C215.2	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1
C215.3	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1
C215.4	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1
C215.5	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1
C215.6	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1
C215	3	2	2	1	1	-	-	-	-	2	1	1	3	2	1

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## C216-CS3461 OPERATING SYSTEMS LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C216.1	Analyze the performance of the various page replacement algorithms.	1,2,3,4,5,9,10,11,12	1,2,3
C216.2	Illustrate the various CPU scheduling algorithms.	1,2,3,4,5,9,10,11,12	1,2,3
C216.3	Implement deadlock avoidance and detection algorithms.	1,2,3,4,5,9,10,11,12	1,2,3
C216.4	Develop, implement and validate operating system algorithms pertaining to management of processes, Memory, files and disks.	1,2,3,4,5,9,10,11,12	1,2,3
C216.5	Execute and validate UNIX commands and shell scripts in Linux.	1,2,3,4,5,9,10,11,12	1,2,3
C216.6	Express the Engineering activities with effective presentation and report.	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C216.1	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C216.2	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C216.3	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C216.4	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C216.5	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C216.6	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C216	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1

  
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## C217- CS3481 DATABASE MANAGEMENT SYSTEMS LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C217.1	Design and develop the real time database application using ER modeling and normalization concepts.	1,2,3,4,5,9,10,11,12	1,2,3
C217.2	Build an application using DDL and DML queries and Write functions and procedures for database applications	1,2,3,4,5,9,10,11,12	1,2,3
C217.3	Design and implement database using ER model and normalization to design and implement database.	1,2,3,4,5,9,10,11,12	1,2,3
C217.4	Perform task as an individual and / or team member to manage the task in time.	1,2,3,4,5,9,10,11,12	1,2,3
C217.5	Compute typical data definitions and manipulation commands.	1,2,3,4,5,9,10,11,12	1,2,3
C217.6	Interpret the findings with appropriate technological / research citation.	1,2,3,4,5,9,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C217.1	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C217.2	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C217.3	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C217.4	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C217.5	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C217.6	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1
C217	3	3	2	2	2	-	-	-	2	2	1	1	2	2	1

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**SEMESTER V**

**C301- CS3591 COMPUTER NETWORKS**

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C301.1	Identify various layers of network and discuss the functions of physical layer.	1,2,3,4,10,11,12	1,2,3
C301.2	Explain the different services of network layer.	1,2,3,4,10,11,12	1,2,3
C301.3	Compare the different transport layer protocols and their applicability based on user requirements.	1,2,3,4,10,11,12	1,2,3
C301.4	Explain the basics of how data flows from one node to another	1,2,3,4,10,11,12	1,2,3
C301.5	Design, calculate, and apply subnet masks and addresses to fulfill networking requirements	1,2,3,4,10,11,12	1,2,3
C301.6	Identify the different types of network devices and their functions within a network	1,2,3,4,10,11,12	1,2,3

**Mapping of COs, POs with PSOs**

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C301.1	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1
C301.2	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1
C301.3	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1
C301.4	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1
C301.5	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1
C301.6	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1
C301	3	3	2	1	-	-	-	-	-	2	1	1	2	1	1



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## C302- CS3501 COMPILER DESIGN

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C302.1	Implement the parser for a given Context Free Grammar using various parsing methods.	1,2,3,4,10,11,12	1,2,3
C302.2	Implement the functionalities of lexical analysis phase like conversion of regular expression to DFA and minimization of DFA.	1,2,3,4,10,11,12	1,2,3
C302.3	Construct a lexical analyzer using Deterministic Finite Automata and Non-Deterministic Finite Automata.	1,2,3,4,10,11,12	1,2,3
C302.4	Develop semantic analyzers for type-checking and intermediate code generators to translate the source program into an intermediate code.	1,2,3,4,10,11,12	1,2,3
C302.5	Demonstrate the different phases of compiler using various programming language	1,2,3,4,10,11,12	1,2,3
C302.6	Construct parsers like top-down, bottom-up with an understanding of Context Free Grammars.	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C302.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C302.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C302.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C302.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C302.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C302.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C302	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1



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## C303-CB3491 CRYPTOGRAPHY AND CYBER SECURITY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C303.1	Discuss the fundamentals of networks security, security architecture, threats and vulnerabilities	1,2,3,4,10,11,12	1,2,3
C303.2	Apply the different cryptographic operations of symmetric cryptographic algorithms	1,2,3,4,10,11,12	1,2,3
C303.3	Apply the different cryptographic operations of public key cryptography	1,2,3,4,10,11,12	1,2,3
C303.4	Apply the various Authentication schemes to simulate different applications.	1,2,3,4,10,11,12	1,2,3
C303.5	Discuss various cyber crimes and cyber security.	1,2,3,4,10,11,12	1,2,3
C303.6	Analyze the security of in-built cryptosystems	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C303.1	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1
C303.2	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1
C303.3	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1
C303.4	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1
C303.5	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1
C303.6	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1
C303	3	2	2	1	-	-	-	-	-	2	1	1	2	2	1

  
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## C304- CS3551 DISTRIBUTED COMPUTING

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C304.1	Interpret the real-time distributed system applications	1,2,3,4,10,11,12	1,2,3
C304.2	Show the use of agreement protocols and fault tolerance mechanisms in distributed systems.	1,2,3,4,10,11,12	1,2,3
C304.3	Explain the various synchronization issues and global state for distributed systems.	1,2,3,4,10,11,12	1,2,3
C304.4	Explain the features of peer-to-peer and distributed shared memory systems	1,2,3,4,10,11,12	1,2,3
C304.5	Illustrate group communication models and global state for distributed systems.	1,2,3,4,10,11,12	1,2,3
C304.6	Describe the fundamentals of distributed systems.	1,2,3,4,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C304.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C304.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C304.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C304.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C304.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C304.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C314	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1



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## SEMESTER VI


### **C308-CCS356 OBJECT ORIENTED SOFTWARE ENGINEERING**

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C308.1	Explain about the fundamentals of object modeling and differentiate Unified Process from other approaches.	1,2,3,4,10,11,12	1,2,3
C308.2	Apply the different static UML diagrams for the given scenario.	1,2,3,4,10,11,12	1,2,3
C308.3	Interpret the UML based software design into pattern-based design.	1,2,3,4,10,11,12	1,2,3
C308.4	Analyze the strengths and weakness of the design specification.	1,2,3,4,10,11,12	1,2,3
C308.5	Construct software design for a real-life problem	1,2,3,4,10,11,12	1,2,3
C308.6	Describe the Object-Oriented concepts and its applications.	1,2,3,4,10,11,12	1,2,3

#### **Mapping of COs, POs with PSOs**

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C308.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C308.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C308.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C308.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C308.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C308.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1
C308	3	3	2	2	-	-	-	-	-	2	1	1	2	2	1

  
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## C309- CS3691 EMBEDDED SYSTEMS AND IOT

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C309.1	Explain the architecture of embedded processors.	1,2,3,4,5,10,11,12	1,2,3
C309.2	Write embedded C programs.	1,2,3,4,5,10,11,12	1,2,3
C309.3	Design simple embedded applications.	1,2,3,4,5,10,11,12	1,2,3
C309.4	Compare the communication models in IOT	1,2,3,4,5,10,11,12	1,2,3
C309.5	Design IoT applications using Arduino/Raspberry Pi /open platform.	1,2,3,4,5,10,11,12	1,2,3
C309.6	Design I/O devices to the processor	1,2,3,4,5,10,11,12	1,2,3

### Mapping of COs, POs with PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C309.1	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1
C309.2	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1
C309.3	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1
C309.4	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1
C309.5	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1
C309.6	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1
C309	3	3	2	2	1	-	-	-	-	2	1	1	2	2	1



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