MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Bachelor of Computer Applications

III & IV Semester Scheme and Syllabus

(2025 Scheme)

VISION

To empower young minds through technology, research and innovation, to produce technically competent and socially responsible professionals in higher education.

MISSION

1. To deliver excellence in education through innovative teaching, impactful research, and continuous skill development, preparing students to meet global challenges with technical expertise and ethical responsibility.
2. To foster a transformative learning environment that integrates technology, research and practical experience, empowering students to become skilled professionals and socially conscious leaders.
3. To cultivate a culture of lifelong learning and professional excellence by encouraging creativity, research, and community engagement, equipping students with the skills to thrive in a dynamic world.
4. To provide a holistic educational experience that combines advanced technology, hands-on research, and community-focused learning, shaping students into competent, ethical professionals who contribute positively to society.

QUALITY POLICY

Rajarajeswari College of Engineering is committed to imparting quality technical education that nurtures competent, ethical professionals with global relevance. We ensure academic excellence through a dynamic, outcome-based curriculum, experienced faculty, and cutting-edge infrastructure. Continuous improvement is driven by innovation, research and strong industry collaboration. We foster holistic development and a progressive environment that supports lifelong learning, teamwork, and professional growth.

CORE VALUES

Academic Excellence, Integrity, Innovation, Global Competence, Continuous Improvement.

Bachelor of Computer Applications

DEPARTMENT VISION

To be a department of excellence in technical education, widely known for the development of application developers, IT professionals, entrepreneurs, researches creates benefit all of humanity.

DEPARTMENT MISSION

1. To ensure diverse knowledge integration with industry for creative learning and application.
2. To nuture talent in usage of application of Digital Intelligence and use of Power of technology.
3. To create entrepreneurs thro incubating technology businesses and committee to create and sustaining to be societal relevant education
4. To ensure the student connect at personal level and focus on to holistic development with Intellectual, Emotional, Spiritual and Behavioral traits.

PROGRAM OUTCOMES (POs)

PO 1 Knowledge: Able to understand and apply the fundamental principles, concepts and methods in diverse areas of computer applications, mathematics, statistics etc.

PO 2 Problem analysis and Development of Solutions: Identify, formulate, research literature and analyze real- time problems. Attain substantiated conclusions to solve the problems using fundamental principles of mathematics, computing sciences by adopting various tools and techniques.

PO 3 Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO 4 Ethics and Social Responsibility: Understand and commit to professional ethics and cyber regulations, responsibilities and norms of professional computing practice.

PO 5 Communication and Team Building: Possess interpersonal skills and communicate effectively with the professionals and with society at large on system activities. Able to comprehend and write effective reports, design documentation, make effective presentations, and give/understand instructions.

PO 6 Project Management and Finance: Innovation, Employability and Entrepreneurial skills Identify opportunity; pursue that opportunity to create value and wealth for the betterment of the individual and society at large. Develop the capacity to study and research independently that will help to develop skills for transition to employment in hardware/software companies.

PO 7 Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO 8 Life Long Learning: Recognize the need and have the ability, to engage in continuous reflective learning in the context of technological advancement. Create, select, adapt and apply appropriate techniques, resources, and computing tools to complex computing activities. Able to learn, adapt and apply emerging tools and technologies to meet the demand.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To progress into the software industry, academia, research, entrepreneurial pursuit, government, consulting firms, and other recent trends in technology enabled services.

PEO2: To achieve peer recognitions an individual or team; by adopting ethics and professionalism and communicating effectively to perform well in cross-culture and inter-disciplinary teams.

PEO3: To continue lifelong professional development in computing for the benefit of self- and societal growth

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Understand the principles of Computer Applications and enrich knowledge in recent advancements and developments in Software Industries.

PSO2: Competent in programming and computing skills, ability to apply software development methodologies and modeling to solve real world problems.

PSO3: To motivated the Students to learn through various programs about emerging technologies.

PSO4: To impart comprehensive knowledge with equal emphasis on theory and practice.

PSO5: To train future industry professionals.

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Rajarajeswari College of Engineering

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Bachelor of Computer Applications

Scheme of Teaching and Examinations – 2025 Scheme

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

III Semester

S.No	Course Category and Course Code		Course Title	TD	Teaching Hours / Semester				Examination				Credits
					Lecture	Tutorial	Practical	TW + SL	CIE Marks	SEE Marks	Total marks	SEE Duration in hours	
					L	T	P	S					
1.	PCC	**B25BCA301**	Digital Principles and Computer Organization	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
2.	PCC	**B25BCA302**	Object Oriented Programming in C++	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
3.	PCC	**B25BCA303**	Operating System Concepts	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
4.	PCC	**B25BCA304**	Relational Data Base Management System	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
5.	PCC	**B25BCA305**	Software Engineering	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
6.	AEC	**B25BCA306**	Reasoning and Aptitude	BCA	**42**	**28**	**0**	**50**	**50**	**50**	**100**	**3**	**3**
7.	PCCL	**B25BCAL307**	Object Oriented Programming in C++ Lab	BCA	**0**	**0**	**28**	**2**	**50**	**50**	**100**	**3**	**1**
8.	PCCL	**B25BCAL308**	Relational Data Base Management System Lab	BCA	**0**	**0**	**28**	**2**	**50**	**50**	**100**	**3**	**1**
9.	**MNC**	**B25BCA309A /B/C/D/E**	National Service Scheme /National Cadet Corps / Physical Education/ Yoga /Music	BCA	**2**	**0**	**0**	**0**	**100**	**-**	**100**	**-**	**PP**
								TOTAL	**400**	**400**	**800**		**20**

Note: **AEC-Ability Enhancement Courses, PCC – Professional Core Courses, PCCL – Professional Core Course Laboratory, VAC – Value Added Courses.**

HOD **Dean-Academics** **Principal**

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Bachelor of Computer Applications

Scheme of Teaching and Examinations – 2025 Scheme

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(Effective from the Academic Year 2025-26)

IV Semester

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					Lecture	Tutorial	Practical	TW + SL	CIE Marks	SEE Marks	Total marks	SEE Duration in hours	
					L	T	P	S					
1.	PCC	**B25BCA401**	Programming in JAVA	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
2.	PCC	**B25BCA402**	Fundamentals of Computer Algorithms	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
3.	PCC	**B25BCA403**	Microprocessor and Applications	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
4.	PCC	**B25BCA404**	Web Technology	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
5.	PCC	**B25BCA405**	Computer Graphics and Image Processing	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
6.	AEC	**B25BCA406**	Cyber-crime and Law	BCA	**42**	**0**	**0**	**48**	**50**	**50**	**100**	**3**	**3**
7.	PCCL	**B25BCAL407**	Programming in JAVA Lab	BCA	**0**	**0**	**28**	**2**	**50**	**50**	**100**	**3**	**1**
8.	PCCL	**B25BCAL408**	Web Technology lab	BCA	**0**	**0**	**28**	**2**	**50**	**50**	**100**	**3**	**1**
9.	**MNC**	**B25BCA409A /B/C/D/E**	National Service Scheme /National Cadet Corps / Physical Education/ Yoga /Music	BCA	**2**	**0**	**0**	**0**	**100**	**-**	**100**	**-**	**PP**
								TOTAL	**400**	**400**	**800**		**20**

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HOD **Dean-Academics** **Principal**

Semester - III					
Digital Principles and Computer Organization **Category : PCC**					
Course Code	:	**B25BCA301**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To understand the fundamentals of digital logic design, including basic gates, Boolean algebra, Karnaugh maps, and number systems.
2.	To analyze and design combinational and arithmetic circuits, such as multiplexers, decoders, adders, and flip-flops.
3.	To gain knowledge of the basic structure and operation of computers, including instruction execution and control unit design.
4.	To explore input/output organization and memory systems, including ROM, cache, and virtual memory concepts.
5.	To understand advanced concepts like arithmetic unit design, pipelining, and embedded systems for real-time applications.

Module – 1	**No. of Hrs**
Digital Logic: The Basic Gates - Universal Logic Gates - AND-OR Invert Gates. Combinational Logic Circuits: Booleans Laws and Theorems - Sum-of-Products Method - Truth Table to Karnaugh Map - Pairs, Quads, and Octets - Karnaugh Simplifications – Don't care Conditions - Product of Sums Method - Product of sums Simplification. Number Systems and Codes: Binary' Number System - Radix Representation of Numbers - Binary-to-decimal Conversion - Decimal-to binary Conversion - Octal Numbers - Hexadecimal Numbers - The ASCII Code - The Excess-3Code - The Gray Code.	9
Module – 2	**No. of Hrs**
Data processing circuits: Multiplexers - Demultiplexers - 1-of-16 Decoder - BCD-to- decimal Decoders - Seven-segment Decoders - Encoders - Exclusive-OR Gates - Parity Generators and Checkers. **Arithmetic Circuits:** Binary Addition - Binary Subtraction - Unsigned Binary Numbers Sign-magnitude Numbers - 2"s Complement Representation - 2"s Complement Arithmetic - Arithmetic Building Blocks - The Adder – Subtracter. FLIP-FLOPs: RS FLIP-FLOPs – Edge triggered RS FLIP-FLOPs - Edge-triggered D FLIP-FLOPs - Edge-triggered JK FLIP-FLOPs – JK Master-Slave FLIP-FLOPs	9
Module – 3	**No. of Hrs**
Basic Structure of Computers: Computer Types - Functional Units - Basic Operational Concepts- Bus Structures. **Basic Processing Unit:** Some Fundamental Concepts - Execution of a Complete Instruction - Hardwired Control - Micro programmed Control.	9
Module – 4	**No. of Hrs**
Input / Output Organization: Accessing I/O devices - Interrupts - Direct Memory Access. **The Memory System:** Some Basic concepts - Read-Only Memories- Speed, Size, and Cost – Cache Memories - Virtual memories.	9
Module – 5	**No. of Hrs**
Arithmetic: Design of Fast Adders Multiplication of Positive Numbers - Integer Division. **Pipelining:** Basic Concepts - Data Hazards - Instruction Hazards. **Embedded Systems:** Examples of Embedded Systems - Processor Chips for Embedded Applications.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Identify the gates , Boolean laws and theorems, make use of K-Map and solve number system related problems
CO2	Explain the function of data processing circuits , flip-flops and able to solve binary arithmetic

CO3	Discuss the computer types , bus structures, addressing modes and identify the procedure for an execution
CO4	Illustrate I/O device accessing , basic concepts of memories and its types
CO5	Demonstrate the design of fast adders, solve multiplication and Division of integers and discuss the concept of pipelining and embedded systems

Text Books	
1.	Donald P. Leach, Albert Paul Malvino, GoutamSaha, 2014, Digital Principles and Applications, 8th edition, Tata McGraw – Hill Publication, New Delhi.
2.	Carl Hamacher, ZvonkoVranesic, SafwatZaky, 2013, Computer Organization, 5th edition, Tata McGraw – Hill Publication, New Delhi.
Reference Text Books	
1.	Morris Mano, 2012, Digital Logic & Computer Design, 5th edition, Prentice Hall of India publishing.
2.	John D. Carpinelli, 2012, Computer System Organization and Architecture, Pearson Indian Education Service Private Limited, Chennai

Web links and Video lectures (e-Resources)

- https://courses.cs.washington.edu/courses/cse370/08wi/pdfs/lectures/04-Logic%20gates.pdf
- http://www.ee.ncu.edu.tw/~jfli/computer/lecture/ch05.pdf
- http://www.pvpsiddhartha.ac.in/dep_it/lecturenotes/CSA/unit-4.pdf

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	2	1	2	1	-
CO2	3	3	1	2	2	1	-	-
CO3	3	2	1	2	2	2	1	-
CO4	2	2	1	1	2	2	-	-
CO5	3	3	1	2	2	2	1	-

Semester -III					
Object Oriented Programming in C++ **Category: PCC**					
Course Code	:	**B25BCA302**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce the principles of Object-Oriented Programming (OOP) and highlight its advantages over procedural programming.
2.	To develop a strong foundation in C++ syntax, including tokens, data types, operators, control structures, and functions.
3.	To enable students to design and implement classes and objects with concepts like constructors, destructors, operator overloading, and type conversions.
4.	To explore and apply various forms of inheritance and polymorphism to promote code reuse and flexibility.
5.	To teach file handling techniques in C++, including stream operations, file pointers, error detection, and command-line arguments.

Module – 1	**No. of Hrs**
Principles of Object Oriented Programming(OOP): Procedure oriented programming – OOP Paradigm – Basic concepts of OOP – Benefits of OOP – Object Oriented Languages – Applications of OOP. Beginning with C++: Simple C++ program – An example with Class – Structure of C++program.	9
Module – 2	**No. of Hrs**
Introduction to C++: Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++.Function in C++ - Main function – Function Prototyping – Call by reference –Return by reference – Inline functions – Default arguments – Function Overloading.	9
Module – 3	**No. of Hrs**
Classes and Objects: Specifying a class- member functions- Memory allocation of objects- Static data members- Static member functions- Objects as function arguments Friendly functions- Pointers to members. Constructors and Destructors – Operator overloading and type conversions	9
Module – 4	**No. of Hrs**
Inheritance: Single Inheritance – Multilevel Inheritance – Multiple Inheritance, Hierarchical Inheritance – Hybrid Inheritance. Polymorphism: Pointers to Objects – Virtual functions	9
Module – 5	**No. of Hrs**
Working with files: Classes for file stream operations – Opening and closing a file- End-of-file detection – File pointers – Error handling during file operations –Command line arguments	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the fundamental principles of Object-Oriented Programming (OOP) and differentiate it from procedural programming paradigms.
CO2	Apply basic C++ syntax including tokens, operators, control structures, and functions to solve simple programming problems.
CO3	Design and implement C++ programs using classes, objects, constructors, destructors, and operator overloading.
CO4	Demonstrate the use of different types of inheritance and polymorphism to implement code reusability and runtime behavior.
CO5	Develop C++ programs to perform file operations and use command line arguments for data input and output.

Text Books	
1.	E.Balagurusamy,2013, Object Oriented Programming with C++, 6th edition, McGraw HillEducation, New Delhi

Reference Text Books	
1.	Herbert Schildt,2003, The Complete Reference C++, 4th edition, Tata McGraw Hill, NewDelhi.

Web links and Video lectures (e-Resources)
• https://www.youtube.com/watch?v=wN0x9eZLix4

ASSESSMENT STRUCTURE:
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CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	-	1	-	1	-
CO2	2	2	2	-	2	-	1	-
CO3	2	2	2	2	1	-	1	-
CO4	3	2	1	-	1	-	1	-
CO5	2	2	1	2	2	1	1	-

Semester-III					
Operating System Concepts **Category: PCC**					
Course Code	:	**B25BCA303**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1	To understand the structure and functions of operating systems, including system architecture, process management, and system calls.
2	To learn and apply various CPU scheduling algorithms and techniques for handling deadlocks in an operating system.
3	To understand memory and virtual memory management concepts such as paging, segmentation, and page replacement strategies.
4	To explore file management techniques, disk scheduling algorithms, and file system security mechanisms.
5	To understand the concepts of distributed processing, client-server architecture, and computer security threats, including viruses and intrusions.

Module – 1	**No. of Hrs**
Introduction: Computer-System Organization–Computer-System Architecture–Operating System Structure– Operating System Operations. Process Management- Kernel Data Structures –Computing Environments-Open Source Operating System-Operating System Structures: Operating System Services–User and Operating-System Interface–System Calls–Types of System Calls–System Programs–System Boot. Process Management: Process Concept- Process Scheduling – Operations on Processes–Inter Process Communication.	9
Module – 2	**No. of Hrs**
Process Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms. **Deadlocks:** System model–Deadlock Characterization–Methods for handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection– Recovery from Deadlock.	9
Module – 3	**No. of Hrs**
Memory Management: Background–Swapping–Contiguous Memory Allocation– Segmentation – Paging – Structure of the Page Table. Virtual Memory Management: Background –Demand Paging– Page Replacement.	9
Module – 4	**No. of Hrs**
File Management: Overview– File Organization and Access– B-Trees– File Directories– File sharing– Record Blocking – Secondary storage Management– File System Security. Disk scheduling: Disk Performance Parameters–Disk Scheduling Polices.	9
Module – 5	**No. of Hrs**
Distributed Processing, Client-Server and Clusters: Client-Server Computing–Service Oriented Architecture–Distributed Message Passing–Remote Procedure Calls. Computer Security Threats: Computer Security Concepts– Threats, Attacks, and Assets–Intruders– Malicious Software Overview–Viruses, Worms, and Bots–Root kits.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate the basics of computer system, architecture and operating system services and process scheduling
CO2	Explain the concept of scheduling criteria with scheduling algorithms, deadlocks and its recovery techniques
CO3	Discuss the background of memory management mechanisms with segmentation, paging and Demand paging
CO4	Describe file management with file organization, access, b-trees, file system Security and disk scheduling
CO5	Compare distributed processing with client server, clusters, and computer Security threats.

Text Books	
1.	Abraham Silberschatz, Peter B Galvin, Gerg Gagne, 2018, Operating System Concepts, 9th edition, Wiley India Pvt .Ltd., New Delhi.
2.	William Stallings, 2018, Operating Systems Internals and Design principles, 7th edition, Pearson Education Inc, Noida.
Reference Text Books	
1	Stuart E. Madnick. JohnJ. Donovan, 2016 (Reprint), Operating Systems, Tata McGrawHill Education, New Delhi.
2	Andrew S.Tanenbaum, 2015, Modern Operating Systems, 4th edition, Pearson Education.

Web links and Video lectures (e-Resources)

- https://www.tutorialspoint.com/operating_system/os_process_scheduling.htm
- http://www.technologyuk.net/computing/operating-systems/process-management.shtml
- https://web.cs.wpi.edu/~cs3013/c07/lectures/Section08Memory_Management.pdf4.https://www.tutorialspoint.com/operating_system/os_file_system.htm

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Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
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PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	1	1	1	1	-
CO2	3	3	1	3	2	2	2	-
CO3	3	2	2	3	3	3	1	-
CO4	3	3	1	1	2	3	2	-
CO5	2	1	1	1	2	3	1	-

Semester -III					
Relational Data Base Management System **Category - PCC**					
Course Code	:	**B25BCA304**	CIE	:	50 Marks
Teaching Hours L : T : P : S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce the fundamental concepts, applications, and architecture of database systems
2.	To understand the relational model, relational algebra, and principles of database design including normalization
3.	To develop skills in SQL for data definition, manipulation, retrieval, and use of joins, views, and functions
4.	To apply transaction management concepts ensuring atomicity, consistency, isolation, and durability in databases.
5.	To gain proficiency in PL/SQL programming with cursors, exceptions, procedures, functions, and triggers for real-world applications.

Module – 1	**No. of Hrs**
Introduction: Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying Transaction Management-Database Architecture –Database Users and Administrators - History of Database Systems. Introduction to the Relational Model: Structure of Relational Databases - Database Schema - keys -Schema Diagrams. Formal Relational Query Languages: The Relational Algebra - Database Design and the E-R Model.	9
Module – 2	**No. of Hrs**
Relational Database Design: Features of Good Relational Designs - Atomic Domains and First Normal Form – 2NF-3NF-BCNF-4NFand 5NF-Storage and File Structure-Overview of physical storage media, Magnetic Disc and flash storage, RAID-File Organization - Organization of records in File-Data Dictionary storage-Database Buffer.	9
Module – 3	**No. of Hrs**
Transactions: Transaction Concept - A Simple Transaction Model - Storage Structure – Transaction Atomicity and Durability -. Structured Query Language (SQL): Introduction – DDL – Naming rules and conventions - Data types-Constraints- Creating a table- Displaying t able information -Altering an existing table – Dropping, renaming, and truncating table - Table types.	9
Module – 4	**No. of Hrs**
Working with tables: DML - Adding a new Row/Record - Customized prompts - Updating and deleting an existing rows/records - Retrieving data from table - Arithmetic operations – Restricting data with WHERE clause - Sorting - Substitution variables - DEFINE command - CASE structure. Functions and Grouping: Built-in functions - Grouping data. Joins and Views: Join - join types Views: Views - Creating a view - Removing a view - Altering a view.	9
Module – 5	**No. of Hrs**
PL/SQL: Fundamentals - Block structure - comments - Data types – Other data types -Variable declaration - Assignment operation - Bind variables - Substitution variables - Printing. - Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - Data manipulation - Transaction control statements. VARRAY. PL/SQL Cursors and Exceptions: Cursors - Implicit & explicit cursors and attributes - cursor FOR loops - SELECT…FOR UPDATE - WHERE CURRENT OF Clause - cursor with parameters - Cursor variables - Exceptions - Types of exceptions - Records - Tables –Nested table-Procedures -Functions-Triggers	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the basic concepts of data model and types of keys in relational database system.
CO2	Design good relational database based on a data model by considering normalization.
CO3	Analyze the requirements of transaction processing, concurrency control and the need for backup and

	recovery.
CO4	Demonstrate the client-server architecture, parallel database and query optimization.
CO5	Apply SQL commands, group and date functions, cursor, triggers, procedures, functions and packages.

Text Books	
1.	Abraham Silberschatz, Henry Korth, S.Sudarshan, 2013, Database System Concepts, 6th edition, McGraw Hill Education Private Limited, NewDelhi.
2.	Bob Bryla, Kevin Loney, 2014, Oracle Database 12c: The Complete Reference, McGraw Hill Education Private Limited, New York (https://www.amazon.com/Oracle-Database- 12c Complete-Reference-ebook/dp/BOODQSTPUE).

Reference Text Books	
1.	Ramez Elmasri, Shamkant B. Navathe, 2013, Database Systems Models, Languages, Design and Application Programming, 6th edition, Pearson Education.
2.	Date C.J, Kannan.A, Swamynathan.S, 2013, Introduction to Database Systems, 8th edition, Pearson Education
3.	Rajesh Narang, 2011, Database Management System, 2nd edition, PHI Learning Private Limited, New Delhi

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	2	1	2	-	-
CO2	2	3	3	1	2	1	-	-
CO3	3	2	3	2	3	2	-	-
CO4	2	2	1	2	2	1	-	-
CO5	2	2	1	1	2	2	-	-

Semester -III					
Software Engineering **Category: PCC**					
Course Code	:	**B25BCA305**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Learning Objective is	
1.	To introduce fundamental concepts of software engineering, including software size, quality, productivity factors, and project planning activities.
2.	To understand and apply software cost estimation techniques and staffing models to predict development and maintenance costs.
3.	To analyze and document software requirements using formal specification methods and various modeling techniques like SADT, SSA, and GIST.
4.	To apply software design principles, modularization techniques, and best practices for implementation and documentation.
5.	To learn and implement software testing strategies and understand the essentials of Software Configuration Management (SCM) processes.

Module – 1	**No. of Hrs**
Introduction to Software Engineering: Introduction –Some definitions –Some size factors– Quality and productivity factors – Managerial issues. Planning a Software Project: Introduction –Defining the problem– Developing a solution strategy – Planning the development process– Planning an organizational structure–Other planning activities.	9
Module – 2	**No. of Hrs**
Software Cost Estimation: Introduction – Software cost factors– Software Cost Estimation Techniques–Staffing Level Estimation–Estimating software maintenance costs.	9
Module – 3	**No. of Hrs**
Software Requirements Definition: Introduction–The Software requirements specification– Formal specification techniques– Relational notations – State oriented notation –Languages and Processors for requirements specification– PSL / PSA – RSL / REVS –Structured analysis and design technique(SADT)–Structured system analysis(SSA)–GIST.	9
Module – 4	**No. of Hrs**
Software Design: Introduction–Fundamental design concepts–Modules and modularizing criteria –Design notations–Design techniques–Design Guidelines. **Implementation Issues:** Structure decoding techniques –coding style–Documentation guidelines.	9
Module – 5	**No. of Hrs**
Software Testing Strategies: A Strategic approach to software testing– Strategic issues– Testing strategies for conventional software–Validation testing–System testing. **Testing Conventional Applications:** Software testing fundamentals – Internal and External views of testing –White-box testing–Basis path testing – Control structure Testing – Black-box Testing. Software Configuration Management: Software configuration management – The SCM repository – The SCM process.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate basic software engineering methods and practices, and their development process model.
CO2	Discuss various software cost factor and cost estimation techniques.
CO3	Demonstrate the basic concepts of Software requirement specification and various Languages and processors for requirements specification.
CO4	Make use of various software design techniques, Notations and Implementation issues.
CO5	Construct various software testing strategies and SCM Process.

Text Books	
1.	Richard.E.Fairely, 2017 ,43rd Edition, Software Engineering Concepts, Tata McGraw–Hill Education Private Limited, New Delhi
2.	Roger S.Pressman, 2018,Software Engineering A Practitioner‟s Approach, 13thedition, Tata McGraw–Hill Education Private Limited, New Delhi.

Reference Text Books	
1.	Ian Sommerville, 2015, Software Engineering, 9th edition, Pearson Indian Education Service Private Limited, Chennai.
2.	PankajJalote2015, An Integrated Approach to Software Engineering, 3rd edition, Narosa Publishing House, New Delhi.
3.	Aggarwalk.k, Yogeshsingh, 2005, Software Engineering, 2nd edition, New age international Private Limited, Publishers, New Delhi.

Web links and Video lectures (e-Resources)
• https://www.tutorialspoint.com/software_engineering/software_engineering_quickguide.htm
• http://moodle.autolab.unipannon.hu/Mecha_tananyag/szoftverfejlesztesi_folyamatok_angol/ch13.html
• https://www.tutorialspoint.com/software_testing/software_testing_tutorial.pdf

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	2	3	2	1	-
CO2	3	2	2	3	3	2	1	-
CO3	3	1	1	2	1	1	1	-
CO4	3	1	2	3	2	2	1	1
CO5	3	3	1	3	1	2	1	-

Semester - III					
Reasoning and Aptitude **Category :AEC**					
Course Code	:	**B25BCA306**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:28:0:50	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Learning Objective is	
1.	To understand and apply various types of analogies and classifications to enhance logical reasoning.
2.	To develop problem-solving skills in basic arithmetic operations including HCF, LCM, and decimal fractions.
3.	To apply mathematical concepts to solve problems related to numbers, ages, and profit & loss.
4.	To analyze and solve problems related to time, work, distance, and trains effectively.
5.	To compute and interpret simple interest, compound interest, and area-based problems.

Module – 1	**No. of Hrs**
Analogy : Completing the Analogous Pair - Simple Analogy - Choosing the Analogous Pair- Double Analogy - Choosing a Simple Word – Detecting Analogies – Three Word Analogy – Number Analogy – Alphabet Analogy . **Classification:** Choosing the Odd Word - Choosing the Odd Pair of Words - Choosing the Odd Numeral - Choosing the Odd Numeral Pair - Choosing the Odd Letter Group	9
Module – 2	**No. of Hrs**
H.C.F and L.C.M of numbers – Decimal fractions.	9
Module – 3	**No. of Hrs**
Problems on numbers – Problems on ages – Profit and loss.	9
Module – 4	**No. of Hrs**
Time and work - Time and distance - Problems on trains.	9
Module – 5	**No. of Hrs**
Simple interest – Compound interest – Area	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Identify and solve various analogy and classification problems to enhance verbal and logical reasoning skills.
CO2	Compute HCF and LCM of numbers and apply operations on decimal fractions in quantitative scenarios.
CO3	Solve real-life problems involving numbers, ages, and profit & loss using arithmetic techniques.
CO4	Apply mathematical reasoning to solve problems on time, work, distance, and trains.
CO5	Calculate simple and compound interest, and solve problems related to area using geometric formulas.

Text Books	
1.	R.S.Agarwal. Reasoning. Chand Publications, 8th Edition
2.	R.S.Agarwal. Quantitative Aptitude. Chand Publications, 7th Edition
Reference Text Books	
1.	A.Abhijit. Quantitative Aptitude for Competitive Examinations Paperback (English). McGraw Hill Education, 5th Edition.
2.	Prem Suri and Sudharshan Chopra. Premier Digest – Arithmetic for Competitive Examinations. Sulthan Chand Publications, New Delhi, 2nd Edition.
3.	Sarvesh K Verma. Quantitative Aptitude Quantum CAT. Arihant Publication

Web links and Video lectures (e-Resources)

- https://nptel.ac.in/courses/122/102/122102009/
- https://www.faceprep.in/quantitative-aptitude/
- https://www.indiabix.com/aptitude/questions-and-answers/
- https://www.examstocks.com/quantitative-aptitude-questions-and-answerspdf/

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	-	2	-	1	-
CO2	3	2	1	-	2	-	2	-
CO3	3	1	3	1	1	2	1	-
CO4	3	2	3	2	2	-	2	1
CO5	2	3	3	-	1	-	1	-

Semester-III					
Object Oriented Programming in C++ Lab **Category: PCCL**					
Course Code	:	**B25BCAL307**	CIE	:	50 Marks
Teaching Hours L : T : P : S	:	0:0:28:2	SEE	:	50 Marks
Total Hours/Semester	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	Understand the concept and application of constructors, copy constructors, and storage classes in C++.
2.	Explore and implement static members, inline functions, and operator overloading techniques.
3.	Apply the principles of inheritance, method overriding, and pointer arithmetic for object-oriented design.
4.	Develop recursive functions, utilize the this pointer, and apply friend functions and classes effectively.
5.	Handle runtime errors using exception handling and implement generic programming using class templates.

Sl. No.	**List of Experiments** **Develop C++ programs for**
1.	Constructor and copy constructor
2.	Storage classes like auto, extern, register and static.
3.	Static member data, static member function and bitwise operators.
4.	Overloading and method overriding.
5.	Inheritance
6.	Pointer Arithmetic.
7.	Inline Functions.
8.	Functions & Recursion. a. Recursion b. Function with “this” pointer
9.	Friend Function & Friend Class.
10.	Exception handling methods.
11.	Overload Unary & Binary Operators as Member Function & Non Member Function. a. Unary operator as member function b. Binary operator as non-member function
12.	Class Templates

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the concepts of oops for building object based applications
CO2	Write a program in different logic with suitable validations for a given problem
CO3	Implement the techniques and features of the Object Oriented Programming constructs to construct an application
CO4	Implement method overloading and method overriding for different user specifications
CO5	Write programs implementing inheritance for an application domain.

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	**Lab Record & Observation**	**Evaluating each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	1	1	-	-
CO2	3	2	3	3	2	2	-	-
CO3	3	2	3	3	2	1	-	-
CO4	3	3	2	3	1	2	-	-
CO5	3	3	2	3	3	2	-	-

Semester-III					
Relational Data Base Management System Lab **Category: PCCL**					
Course Code	:	**B25BCAL308**	CIE	:	50 Marks
Teaching Hours L : T : P : S	:	0:0:28:0	SEE	:	50 Marks
Total Hours/Semester	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To provide a strong foundation in SQL including DDL, DML, DCL, and advanced SQL concepts.
2.	To teach ER models and relational database design including normalization.
3.	To introduce stored procedures, triggers, and their integration in client applications.
4.	To develop an understanding of Oracle database operations such as system functions and aggregate queries.
5.	To explain database administration tasks like installation, backup, recovery, and batch processing.

Sl. No.	List of Experiments
1.	Basic SQL – DDL & DML, Views, Group operations, aggregate operations, System operations in Oracle
2.	Intermediate SQL –Joins, Subqueries, DCL operations
3.	Advanced SQL – Nested tables, V-arrays
4.	ER Modeling
5.	Database Design and Normalization
6.	Stored procedures and using them in a client application
7.	Triggers and their front end application
8.	DBA mechanisms – Installation, Backup and recovery operations, Batch processing

Course Outcomes: At the end of the course, the students will be able to	
CO1	Model Entity Relationship with E-R diagrams
CO2	Design database schema considering normalization and relationships within database
CO3	Write SQL queries to user specifications
CO4	Develop triggers, procedures, user defined functions and design accurate and PLSQL programs in Oracle and DB2
CO5	Use the database from a front end application

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	Type of Assessment	Max. Marks	Max. Marks Scaling	Total Marks

			Down to	
Laboratory	**Lab Record & Observation**	**Evaluating each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	-	-	-
CO2	3	3	3	1	1	-	-	-
CO3	3	3	3	1	2	2	-	-
CO4	3	3	3	1	2	2	-	-
CO5	2	1	1	1	1	2	-	-

Semester-IV					
Programming in JAVA **Category - PCC**					
Course Code	:	**B25BCA401**	CIE	:	50 Marks
Teaching Hours L: T: P: S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce the fundamental concepts of object-oriented programming and the Java language syntax.
2.	To familiarize students with classes, objects, methods, and constructors in Java.
3.	To understand and implement key OOP concepts such as encapsulation, inheritance, and polymorphism.
4.	To explain and apply control structures, arrays, exception handling, and string operations.
5.	To develop programs using packages, interfaces, and advanced features like static and abstract classes.

Module – 1	**No. of Hrs**
Object-Oriented Programming Concepts: Encapsulation, Inheritance, Polymorphism- Features of Java Language - Types of Java Programs - Java Architecture - Data Types - Structure of a Java Program – Comments - Type Conversion - Block Statements and Scope- Operators. **Control Statements:** The if...else Statement - The switch Statement - The while Statement - The do...while Statement - The for...Statement - The break Statement - The continue Statement - The comma Statement – Array: Single Dimensional Array – Multi Dimensional Array.	9
Module – 2	**No. of Hrs**
Classes: Defining a Class - The new Operator and Objects - The dot Operator - Method Declaration and Calling - Constructors - Instance Variable Hiding - this in Constructor - Method Overloading - Passing Objects as Parameters to Methods.	9
Module – 3	**No. of Hrs**
Inheritance: Creating Subclasses - Method Overriding - Final Class- Final Method - Final Variables- Object Destruction and Garbage Collection – Recursion- Static Methods, Block and Variables- Static Method - Static Variables - Static Block - Abstract Classes.	9
Module – 4	**No. of Hrs**
Packages and Interfaces: Packages–Defining a Package–Finding Packages and CLASS PATH A Short Package- Example Packages and Member Access – An Access –Example– Importing Packages-Interfaces–Defining an Interface–Implementing Interfaces -Nested Interfaces– Applying Interfaces Variables in Interfaces.	9
Module – 5	**No. of Hrs**
Exception Handling: Exception– Handling Fundamentals – Exception Types- Uncaught Exceptions - Multiple catch Clauses–Nested try Statements-throw–throws-finally-Java's Built-in Exceptions. Creating Your Own Exception. **String Handling:** The String Constructors-String Length–String Operations –String Buffer– String Buffer methods–String Builder Classes.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the principles of object-oriented programming and the features of the Java language.
CO2	Write Java programs using classes, objects, methods, and constructors.
CO3	Implement inheritance, method overloading/overriding, and use polymorphism effectively
CO4	Develop Java programs using control structures, arrays, and handle exceptions properly.
CO5	Create and use packages, interfaces, static and abstract features in Java for modular programming.

Text Books	
1	E Balagurusamy, 2019, A Programming with JAVA, McGraw Hill Education (India) PrivateLimited,6th Edition.

2	Dr.K. Somasundaram, Programming in JAVA2, Jaico Publisher.
Reference Text Books	
1	Herbert Schildt, 2019,"JavaThe Complete Reference", Eleventh Edition, OraclePress,New Delhi.
2	Allen B.Downey&ChrisMayfield, 2020, Think Java, O"reilly Media Inc Sebastopol, CA.

Web links and Video lectures (e-Resources)
Resources 1. https://onlinecourses.nptel.ac.in/noc24_ce107/preview 2. http://www.digimat.in/nptel/courses/video/106106126/L01.html

ASSESSMENT STRUCTURE:

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CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Any Two Assessments as per regulations**	**10+10**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	2	1	2	1	-
CO2	2	3	2	3	2	1	-	-
CO3	3	3	2	1	2	2	1	-
CO4	3	3	2	1	3	2	-	-
CO5	3	3	1	3	2	2	1	-

Semester - IV					
Fundamentals of Computer Algorithms **Category: PCC**					
Course Code	:	**B25BCA402**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Objective is	
1.	To introduce fundamental algorithm design concepts and analyze their performance.
2.	To teach various algorithmic strategies such as divide-and-conquer, greedy, dynamic programming, and backtracking.
3.	To understand and implement fundamental data structures like stacks queues, trees, and graphs.
4.	To apply different algorithmic techniques to real-world problems like sorting, shortest path, spanning trees, and knapsack problems.
5.	To enable students to compare algorithmic approaches based on time and space complexity.

Module – 1	**No. of Hrs**
Introduction: What is an Algorithm - Algorithm Specification- Performance Analysis – Elementary Data Structure – Stacks and Queues- Trees – Binary Trees – Binary Search Trees – Priority Queue – Heap and Heap sorts - Graphs: Introduction –Definitions- Graph Representations. **Basic Traversal and Search Technique:** Techniques For Binary Trees-Techniques for Graphs :Breadth First Search and Traversal – Depth First Search and Traversal.	9
Module – 2	**No. of Hrs**
Divide and Conquer methodology: Finding maximum and minimum - Merge sort -Quick sort – Selection sort - Strassen's Matrix Multiplication.	9
Module – 3	**No. of Hrs**
Greedy Method: Introduction – Knapsack Problem–Tree Vertex Splitting- Job Sequencing with Deadlines- Minimum-Cost Spanningtrees Prim's Algorithm- Kruskal's Algorithm - An Optimal Randomized Algorithm – Single source Shortest Path.	9
Module – 4	**No. of Hrs**
Dynamic programming: General Methods- Multi stage graph – All Pairs Shortest Path—Optimal Binary Search Trees-0/1 Knapsack Problem – Travelling Salesperson Problem – Flow shop scheduling.	9
Module – 5	**No. of Hrs**
Backtracking: The General Method- The8-QueensProblem- Sum of Subsets-Graph Coloring – Hamiltonian Cycles – Knapsack problem.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Define and analyze the performance of algorithms and utilize basic data structures.
CO2	Apply divide-and-conquer strategies to solve problems like sorting and matrix multiplication.
CO3	Implement greedy algorithms for optimization problems such as knapsack, job scheduling, and spanning trees.
CO4	Use dynamic programming for solving complex problems including TSP and optimal BSTs.
CO5	Solve constraint satisfaction problems using backtracking techniques like 8-Queens and graph coloring

Text Books	
1	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran “Fundamentals of Computer Algorithms, Universities Press, 2nd Edition, 2019.
Reference Text Books	
1	Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, 3rd Edition, Pearson Education, 2012.

Web links and Video lectures (e-Resources)
• https://www.youtube.com/watch?v=8hly31xKli0

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Any Two Assessments as per regulations**	**10+10**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	1	-	1	-
CO2	3	2	2	2	2	-	1	-
CO3	3	3	2	2	2	-	1	-
CO4	3	3	3	2	2	-	1	-
CO5	2	3	3	2	2	1	1	-

Semester - IV					
Microprocessor and Applications **Category - PCC**					
Course Code	:	**B25BCA403**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1	To introduce the architecture, instruction set, and programming concepts of the Intel 8086 microprocessor.
2	To explain the process of developing assembly language programs using tools and directives.
3	To describe memory and I/O interfacing techniques using programmable devices.
4	To introduce the Intel 8051 microcontroller and its architecture, instruction set, and I/O functionalities.
5	To explore system design concepts using 8086 and provide an overview of multiprocessor

Module – 1	**No. of Hrs**
The 8086 Microprocessor: Introduction to Microprocessors - Introduction to INTEL 8086 - Introduction to 8086 Instructions - Format of 8086 Instructions - Addressing Modes of the 8086 -Instructions Affecting Flags of 8086 - Classification of 8086 Instructions - Examples of 8086 Assembly Language Instructions - Byte and String Manipulation in 8086 - Interrupt and Interrupt Service Routine in 8086 - Classification of Interrupts of 8086 - Priorities of Interrupts of 8086.	9
Module – 2	**No. of Hrs**
Introduction to Assembly-Language Programming: Levels of Programming - Flow Chart - Variables and Constants Used in Assemblers - Assembler Directives - Assembly-Language Program Development Tools – Editor - Assembler - Library Builder – Linker - Debugger – Simulator -Emulator - Hand Coding of Assembly-Language Programs	9
Module – 3	**No. of Hrs**
Memory and IO Interfacing: Introduction to Memory - Memory Interfacing- IO Interfacing- Parallel Communication Interface: Programmable Peripheral Interface (INTEL 8255)- Pins Signals and Functional block diagram of 8255 - Programmable Timer (INTEL 8254): Pins- Signals and Functional block diagram of 8254- Programmable Interrupt Controller (INTEL 8259): Pins Signals and Functional block diagram of 8259.	9
Module – 4	**No. of Hrs**
THE 8051 Microcontroller: Introduction to Microcontrollers - Introduction to the INTEL8051 Microcontroller - Special Function Registers (SFR) of 8051- IO Ports and Circuits of 8051- AddressingModesin8051-Instructions Affecting Flags of 8051-Classification of 8051 Instructions	9
Module – 5	**No. of Hrs**
The 8086 microprocessor based system and advanced processor: Pins and Signals of INTEL 8086 - System Design Using the 8086 Microprocessor - System Bus Structure – IO Programming - Introduction to Multiprogramming - Multiprocessor Configurations - Introduction to Advanced Processors.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Know the concepts of microcomputer and micro processors and internal architecture of 8086 microprocessor.
CO2	Have a knowledge on structured assembly language programs to solve the problems using 8086 microprocessor
CO3	Describe memory organization of 8086, functionality of programmable peripheral interface and programmable interrupt controller.
CO4	Discuss the concept of micro controller and its working methodology
CO5	Analyze pins and signals of 8086 and advanced processors

Text Books	
1	Nagoor Kani, 2017, Microprocessor and Microcontroller, McGraw – Hill Education (India),Private Limited.
Reference Text Books	
1	Krishna Kant, 2016, Microprocessor and Microcontrollers Architecture, Programming andSystem Design 8085,8086,8051,8096, 2nd edition, PHI Learning Private Limited, NewDelhi.
2	Ramesh S. Gaonkar, 2013, Microprocessor Architecture, Programming and Applicationwith the 8085.

Web links and Video lectures (e-Resources)
• https://www.tutorialspoint.com/assembly_programming/assembly_variables.htm • https://www.geeksforgeeks.org/microprocessor-tutorials/ • http://examradar.com/memories-io-interfacing/

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Any Two Assessments as per regulations**	**10+10**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	3	1	1	1	1	-	1
CO2	3	3	3	3	2	2	2	-	1
CO3	3	2	3	3	3	1	1	-	-
CO4	2	2	3	2	2	1	2	-	1
CO5	2	2	3	3	2	2	1	-	1

Semester - IV					
Web Technology **Category - PCC**					
Course Code	:	**B25BCA404**	CIE	:	50 Marks
Teaching Hours L :T : P : S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce the structure and basic tags of HTML for web page development.
2.	To teach the use of lists, text formatting and special HTML tags to format content.
3.	To explain the creation and formatting of HTML tables using relevant tags and attributes.
4.	To develop skills in using hyperlinks, images, and frames in web design.
5.	To provide knowledge for designing HTML forms and creating complete web pages.

Module – 1	**No. of Hrs**
Introduction to HTML: HTML Tags – Structure of HTML Program – Head Tag - Body Tag – Paragraph Tag – Formatting Tags (Bold, Underline, Italic, Strikethrough, Subscript, Superscript, Big, Small)	9
Module – 2	**No. of Hrs**
List: Lists - Ordered List - Unordered List - Data Definition List – Marquee Tag - Break Tag - Ruler Tag - Font Tag.	9
Module – 3	**No. of Hrs**
Table: Table - Table building Tags - Attributes of Table - Table Tag – Table Header Tag - Table Row Tag - Table Data Tag - Row Span - Column Span.	9
Module – 4	**No. of Hrs**
Links and Images: Links - Linking Pages Using Anchor Tag - Attributes of Anchor Tag - Image Tag and its Attributes - Frame Tag.	9
Module – 5	**No. of Hrs**
Forms: Forms - Form Tag - Input Tag – Input Types (Textbox, Radio button, Checkbox, Password) - Selection Tag – Text Area Tag - Sample Web Page Creation.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Describe the basic tags design in static pages.
CO2	Express the basic functions of lists in web designing.
CO3	Develop web based application using suitable tags, links and images.
CO4	Analyze the Table tags usage in web page.
CO5	Dissect the web page using frames.

Text Books	
1	Ivan Bayross. Web Enabled Commercial Applications Development Using HTML,DHTML, JavaScript,Perl CGI. BPB Publicatons, 2nd Revised Edition, 2000.

Reference Text Books	
1	John W.Gosney. HTML Professional Project. Thomoson Course Technology,2004.
2	Eric Freeman & Elisabeth Robson. A Brain-Friendly Guide Head First HTML5Programming. O'Reilly Media, Inc., 1st Edition

Web links and Video lectures (e-Resources)	
	Web Sources 1. https://nptel.ac.in/courses/106/105/106105084/ 2. https://nptel.ac.in/courses/106/106/106106092/ 3. https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment1	50	40 (Average of Best two Assessments)	50
	Internal Assessment2	50		
	Internal Assessment3	50		
Self Learning	Any Two Assessments as per regulations	10+10	10	
SEE	Semester End Examination	100	50	50
Grand Total				100

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	1	2	-	-
CO2	2	1	1	1	2	1	-	-
CO3	2	1	1	2	1	2	-	-
CO4	2	1	1	2	1	1	-	-
CO5	1	1	1	1	1	2	-	-

Semester - IV					
Computer Graphics and Image Processing **Category : PCC**					
Course Code	:	**B25BCA405**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Learning Objective is	
1	To introduce the fundamentals of computer graphics and various display systems
2	To develop an understanding of output primitives and drawing algorithms.
3	To explain the attributes of graphical elements and anti-aliasing techniques.
4	To provide knowledge on 2D geometric transformations and clipping algorithms.
5	To familiarize students with digital image processing fundamentals, color models, and pixel operations.

Module – 1	**No. of Hrs**
Overview of Graphics Systems: Video Display Devices – Refresh Cathode -Ray Tubes - Raster Scan - Random Scan Displays – Color CRT Monitors – DirectView Storage Tubes – Flat Panel Displays - Raster Scan and Random Scan Systems– Input Devices.	9
Module – 2	**No. of Hrs**
Output Primitives: Line Drawing - Circle Generating - Ellipse GeneratingAlgorithms – Boundary Fill Algorithm – Flood Fill Algorithm – CharacterGeneration.	9
Module – 3	**No. of Hrs**
Attributes of Output Primitives: Line – Area – Fill – Character – Text -Marker and Bundled Attributes - Anti Aliasing Techniques.	9
Module – 4	**No. of Hrs**
Geometric Transformations: Basic Transformations - Reflection andShear – Window – To - View Port Transformation – Point – Line – Polygon – Text -Exterior Clipping Operations.	9
Module – 5	**No. of Hrs**
Digital Image Fundamentals: Introduction – Origin – Steps in DigitalImage Processing – Components – Elements of Visual Perception – Image Sensingand Acquisition – Image Sampling and Quantization – Relationships betweenpixels – color models.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate basic software engineering methods and practices, and theirdevelopment process model.
CO2	Discuss various software cost factor and cost estimation techniques
CO3	Demonstrate the basic concepts of Software requirement specificationand various Languages and processors for requirements specification
CO4	Make use of various software design techniques ,Notations andImplementation issues
CO5	Construct various software testing strategies and SCM Process.

Text Books	
1	Donald Hearn and M.Pauline Baker. Computer Graphics, C Version. PearsonEducation, second Indian reprint, 2003.
2	Rafael C. Gonzales, Richard E. Woods. Digital Image Processing. ThirdEdition, Pearson Education, 2010.

Reference Text Books

1. 1. N. Krishnamurthy. Introduction to Computer Graphics. Tata McGraw-Hill, 2002.
2. 2. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins. Digital Image
3. Processing Using MATLAB. 3rd Edition Tata Mc Graw Hill Pvt. Ltd, 2011.

Web links and Video lectures (e-Resources)

1. https://www.nptelvideos.com/video.php?id=955&c=10
2. https://www.javatpoint.com/computer-graphics-dda-algorithm

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	1	2	1	-
CO2	3	2	3	1	1	2	1	-
CO3	2	3	2	1	1	1	1	-
CO4	2	2	3	2	2	1	1	1
CO5	3	1	2	1	1	1	1	-

Semester-IV					
Cyber–Crime and Law **Category: AEC**					
Course Code	:	**B25BCA406**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	42:0:0:48	SEE	:	50 Marks
Total Hours/Semester	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Learning Objective is	
1.	Understand and describe the major types of cybercrime
2.	Identify cybercrime vulnerabilities and exploitations of the Internet.
3.	Understand the law with regards to the investigation and prosecution of cyber criminals.
4.	Apply appropriate law enforcement strategies to both, prevent and control cybercrime.

Module – 1	**No. of Hrs**
Cyber Crime: Definition and Origin of the Word, Cyber Crime and Information Security, who are Cyber Criminals, Classification of Cybercrimes, E-mail Spoofing, Spamming, Cyber Defamation, Internet Time Theft, Salami Attack, Salami technique Data Diddling, Forgery, Web Jacking, Newsgroup Spam, Industrial Spying, Hacking, Online Frauds, Pornographic Offenders, Software Piracy, Computer Sabotage Email Bombing, Computer Network Intrusion, Password Sniffing, Credit Card Frauds, Identity Theft.	9
Module – 2	**No. of Hrs**
Cyber Offenses: How Criminals plan them, Categories of Cyber Crimes, How Criminal Plans the Attack: Active Attacks, Passive Attacks, Social Engineering, Classification of Social Engineering, Cyber Stalking: types of Stalkers, Cyber Cafe and Cyber Crimes, Botnets, Attack Vectors, Cyber Crime and Cloud Computing.	9
Module – 3	**No. of Hrs**
Tools and Methods used in Cybercrime: Proxy server and Anonymizers, phishing: How Phishing works? How password cracking works? Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Dos and DDOS Attacks, SQL Injection, Buffer Overflow, An Attack on Wireless Networks.	9
Module – 4	**No. of Hrs**
Phishing and Identity Theft: Phishing: Methods of Phishing, Phishing Techniques, Types of Phishing Scams, Phishing countermeasures, Identity theft, Types and Techniques of identity thefts and its counter measures.	9
Module – 5	**No. of Hrs**
IT ACT, Offenses and Penalties: Offences under the Information and Technology Act 2000 - Penalty and adjudication - Punishments for contraventions under the Information Technology Act 2000 (Case Laws, Rules and recent judicial pronouncements to be discussed) - Limitations of Cyber Law.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand and describe the major types of cybercrime.
CO2	Identify cybercrime vulnerabilities and exploitations of the Internet.
CO3	Understand the law with regards to the investigation and prosecution of cyber criminals.
CO4	Apply appropriate law enforcement strategies to both, prevent and control cybercrime.

Text Books	
1.	Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives By Nina Godbole, Sunit Belapur, Wiley
2.	Understanding Cybercrime: Phenomena, and Legal Challenges Response, ITU 2012

Reference Text Books	
1.	Cyber Crimes and Laws by Santosh Kumar, Gagandeep Kaur Edition: 3rd Edition, 2024

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/122/102/122102009/ 2. https://www.faceprep.in/quantitative-aptitude/ 3. https://www.indiabix.com/aptitude/questions-and-answers/ 4. https://www.examstocks.com/quantitative-aptitude-questions-and-answerspdf/

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	-	2	-	1	-
CO2	3	2	3	-	2	-	2	-
CO3	3	3	3	3	3	2	1	-
CO4	3	2	3	2	2	-	2	1

Semester-IV					
Programming in JAVA Lab **Category: PCCL**					
Course Code	:	**B25BCAL407**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:28:2	SEE	:	50 Marks
Total Hours/Semester	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce the practical implementation of core Java programming concepts.
2.	To develop problem-solving skills using recursion, control structures, and loops in Java.
3.	To apply the principles of OOP such as method and constructor overloading, abstraction, and interfaces.
4.	To demonstrate Java's capabilities in string manipulation, class design, exception handling, and modular programming.
5.	To strengthen understanding of Java features like inner classes, packages, and exception handling through practical examples.

Sl. No.	**List of Experiments**
1	Write a java program to find the Fibonacci series using recursive and non-recursive functions
2	Write a java program to multiply two given matrices.
3	Write a java program for Method overloading and Constructor overloading.
4	Write a java program that checks whether a given string is palindrome or not.
5	Write a Java program to print the following triangle of numbers 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5
6	Write a java program to represent Abstract class with example.
7	Write a java program to implement Interface using extends keyword.
8	Write a Java program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 5 = 5*4*3*2*1)
9	Write a Java program to accept a number and find whether the number is Prime or not
10	Write a java program to create user defined package.
11	Write a java program to create inner classes.
12	Write a java program for creating multiple catch blocks.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Write Java programs using recursive and iterative approaches for solving numerical problems like Fibonacci, prime checking, and factorials.
CO2	Implement matrix operations, string manipulations, and triangle-based number patterns using loops and conditionals.
CO3	Apply method overloading, constructor overloading, and abstract classes in object-oriented design.
CO4	Develop modular Java programs using user-defined packages, interfaces, and inner classes.
CO5	Handle exceptions effectively using multiple catch blocks and explore Java's runtime behavior.

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Laboratory	**Lab Record & Observation**	**Evaluating each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

CO-PO Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	3	2	3	1	1	-	-
CO2	3	2	3	3	2	2	-	-
CO3	3	2	3	3	2	1	-	-
CO4	3	3	2	3	1	2	-	-
CO5	3	3	2	3	3	2	-	-

Semester-IV					
Web Technology lab **Category: PCCL**					
Course Code	:	**B25BCAL408**	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:28:2	SEE	:	50 Marks
Total Hours/Semester	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce the basics of HTML and its role in web development.
2.	To enable students to use various HTML tags for structuring and formatting web content.
3.	To demonstrate how to incorporate multimedia and interactivity in web pages.
4.	To develop the ability to create structured and user-friendly HTML documents like forms, lists, and tables.
5.	To provide practical skills in designing simple static web pages.

Sl. No.	**List of Experiments**
1.	Write a HTML program using basic text formatting tags
2.	Write a HTML program by using text formatting tags.
3.	Write a HTML program using presentational element tags <b>, <i>, <strike>, <sup>, <sub>, <big>, <small>, <hr>
4.	Write a HTML program using phrase element tags <blockquote>, <cite>, <abbr>, <acronym>, <kbd>, <address>
5.	Write a HTML program using different list types
6.	Create a HTML page that displays ingredients and instructions to prepare a recipe.
7.	Write a HTML program using grouping elements and .
8.	Write a HTML program using images, audios, videos
9.	Write a HTML program to create your time table.
10.	Write a HTML program to create login form and verify username and password

Course Outcomes: At the end of the course, the students will be able to	
CO1	Use basic text formatting and presentational tags to enhance web content.
CO2	Create HTML documents using phrase and grouping elements effectively.
CO3	Design structured web pages using lists, tables, and multimedia elements.
CO4	Develop functional forms with input fields and basic validation logic.
CO5	Construct static web pages for real-life applications such as recipes, timetables, and login pages.

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.

- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	**Lab Record & Observation**	**Evaluating each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	-	-	-
CO2	2	3	3	1	1	-	-	-
CO3	2	2	2	1	2	2	-	-
CO4	3	3	3	1	2	2	-	-
CO5	2	1	1	1	1	2	-	-

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Common Courses
Semester III / IV

(2025 Scheme)

Semester-III/IV					
National Service Scheme **Category: MNC**					
Course Code	:	**B25BCA309A /409A**	CIE	:	100 Marks
Teaching Hours L : T : P : S	:	0:0:0:28	SEE	:	--
Total Hours/Semester	:	28	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	--

Course objectives: National Service Scheme (NSS) will enable the students to:	
1.	Understand the community in general in which they work.
2.	Identify the needs and problems of the community and involve them in problem –solving.
3.	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
4	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

Syllabus	**28 Hours**
I. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing. **II.** Waste management– Public, Private and Govt organization. **III.** Setting of the information imparting club for women leading to contribution in social and economic issues. **IV.** Water conservation techniques – Role of different stakeholders– Implementation. **V.** Preparing an actionable business proposal for enhancing the village income and approach for implementation. **VI**. Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education. **VII.** Developing Sustainable Water management system for rural areas and implementation approaches. **VIII.** Contribution to any national level initiative of Government of India. Forex. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc. **IX**. Spreading public awareness under rural outreach programs.(minimum5 programs). **X**. Plantation and adoption of plants. Know your plants. **XI**. Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs). **XII**. Govt. school Rejuvenation and helping them to achieve good infrastructure.	

Pedagogy – Guidelines, it may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl. No	Topic	Group Size	Location	Activity Execution	Reporting	Evaluation of the Project
1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers land/Villages/ roadside / community area/ College campus etc….	Site selection /proper consultation/ Continuous monitoring/ Information board		
2	Waste management– Public, Private and Govt organization.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	Site selection /proper consultation/ Continuous monitoring/ Information board		

3	Setting of the information imparting club for women leading to contribution in social and economic issues.	May be individual or team	Women empowerment groups/ Consulting NGOs & Govt Teams / College campus etc.	Group selection/ pro per consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
4	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	site selection / proper consultation/ Continuous monitoring/ Information board		
5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	Group selection/pro per consultation/ Continuous monitoring/ Information board		
6	Helping local schools to achieve good results and enhance their enrolment in Higher/technical/ vocational education.	May be individual or team	Local government / private/ aided schools/Government Schemes officers	School selection/proper consultation/ Continuous monitoring/ Information board		
7	Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	site selection/proper consultation/ Continuous monitoring/ Information board		
8	Contribution to any national level initiative of Government of India. Ex. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	Group selection/pro per consultation/ Continuous monitoring / Information board		
9	Spreading public awareness under rural outreach programs.(minimu m5 programs).	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	Group selection/pro per consultation/ Continuous monitoring / Information board		
10	Plantation and adoption of plants. Know your plants.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	Place selection/ proper consultation/ Continuous monitoring / Information board		
11	Organize National integration and	May be individual	Villages/ City Areas / Grama panchayat/	Place selection/ proper consultation/		

	social harmony events /workshops /seminars.	or team	public associations/ Government Schemes officers	Continuous monitoring / Information board		
12	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers	Place selection/ proper consultation/ Continuous monitoring / Information board		

Plan of Action (Execution of Activities For Each Semester)

Sl. No	Practice Session Description
1	Lecture session by NSS Officer
2	Students Presentation on Topics
3	Presentation - 1 , Selection of topic, PHASE - 1
4	Commencement of activity and its progress - PHASE - 2
5	Execution of Activity
6	Execution of Activity
7	Execution of Activity
8	Execution of Activity
9	Execution of Activity
10	Case study based Assessment, Individual performance
11	Sector wise study and its consolidation
12	Video based seminar for 10 minutes by each student At the end of semester with Report.

- In III and IV semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.

Course Learning Outcomes: Upon successful completion of this course, the student will be able to:	
1.	Understand the importance of his / her responsibilities towards society.
2.	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
3.	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
4	Implement government or self-driven projects effectively in the field. CO5:
5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

- Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general.
- **Suggested Learning Resources:**
- 1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
- 2. Government of Karnataka, NSS cell, activities reports and its manual.
- 3. Government of India, nss cell, Activities reports and its manual.

ASSESSMENT STRUCTURE:

This course is having only Continuous Internal Assessment (CIE) marks of 100. A student shall obtain a minimum of 40% marks out of 100 to qualify in the course.

Sl. No	Activity	Max. Marks
1.	Attendance	20
2.	Quizzes /Assignment – 2, each of 25marks	50
3.	Report/ Participation Certificate	30
Total		**100**

Semester-III/IV					
National Cadet Corps Category: MNC					
Course Code	:	**B25BCA309B /409B**	CIE	:	100 Marks
Teaching Hours L : T : P : S	:	0:0:0:28	SEE	:	--
Total Hours/Semester	:	28	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	--

Course Objectives	
1.	To develop character, camaraderie, discipline, secular outlook, the spirit of adventure, sportsman spirit, and ideals of selfless service amongst cadets by working in teams, honing qualities such as self-discipline, self- confidence, self-reliance, and dignity of labour in the cadets.
2.	To create a pool of organized, trained, and motivated youth with leadership qualities from all walks of life, who will serve the Nation regardless of which career they choose
3.	To provide a conducive environment to motivate young Indians to choose the Armed Forces as a career

Content	No. of Hours
Unit 1. Personality Development: Group Discussions - Change your Mindset, Public Speaking. **Unit 2.**LeadershipDevelopment: Case Studies– APJ Abdul Kalam, DeepaMalik, Maharana Pratap, N Narayan Murthy etc. **Unit 3.** Disaster management: Disaster Management Capsule, Organization, Types of Disasters, Essential Services, Assistance, Civil Defense Organization. **Unit 4**.Adventure:AdventureActivities **Unit 5.** Border & Coastal Areas: History, Geography &Topography of Border/ Coastal Areas. **Unit 6.** Drill: Arm Drill, Rifle ke saath Savdhan, Vishram aur Aram se, Rifle ke saath Parade Paraur Saj, Riflekesaath Visarjan, LineTod, Bhumi Shastra aur Uthao Shastra, BagalShastra aur Baju Shastra. **Unit 7**.WeaponTraining: Short Range firing. **Unit 8.**MapReading:SettingofMap,FindingsNorthandOwnPosition **Unit 9.**Field Craft & Battle Craft: Observation, Camouflage, Concealment. **Unit 10.** Obstacle Training: Obstacle training - Introduction, Safety-measures, Benefits. Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- Zag Balance, High Wall	28

ASSESSMENT STRUCTURE:

This course is having only Continuous Internal Assessment (CIE) marks of 100. A student shall obtain a minimum of 40% marks out of 100 to qualify in the course.

Sl. No	Activity	Max. Marks
1.	Attendance	20
2.	Quizzes /Assignment – 2, each of 25marks	50
3.	Report/ Participation Certificate	30
Total		**100**

Semester-III/IV					
Physical Education **Category: MNC**					
Course Code	:	**B25BCA309C /409C**	CIE	:	100 Marks
Teaching Hours L : T : P : S	:	0:0:0:28	SEE	:	--
Total Hours/Semester	:	28	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	--

ourse Outcomes: At the end of the course, the student will be able to	
1.	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
2.	Familiarization of health-related Exercises, Sports for overall growth and development
3.	Create a foundation for the professionals in Physical Education and Sports
4.	Participate in the competition at regional/state / national / international levels.
5.	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.
6	Understand and practice of Traditional Games

Syllabus	28 Hours
I. Orientation 1. Lifestyle 2. Health & Wellness 3. Pre-Fitness test. **II. General Fitness & Components of Fitness** 1. Warming up (Free Hand exercises) 2. Strength – Push-up / Pull-ups 3. Speed – 30 Mtr Dash **III. Specific games (Any one to be selected by the student)** 1. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. 2. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up. **IV. Ethics and Moral Values** 1. Ethics in Sports 2. Moral Values in Sports and Games **V. Specific Games (Any one to be selected by the student)** 1. Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass. 2. Athletics (Track Events) – Any event as per availability of Ground. **VI. Role of Organisation and administration**	

ASSESSMENT STRUCTURE:

This course is having only Continuous Internal Assessment (CIE) marks of 100. A student shall obtain a minimum of 40% marks out of 100 to qualify in the course.

Sl. No	Activity	Max. Marks
1.	Attendance	20
2.	Quizzes /Assignment – 2, each of 25marks	50
3.	Report/ Participation Certificate	30
Total		**100**

Semester-III/IV					
YOGA **Category: MNC**					
Course Code	:	**B25BCA309D/409D**	CIE	:	100 Marks
Teaching Hours L : T : P : S	:	0:0:0:28	SEE	:	--
Total Hours/Semester	:	28	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	--

Course Learning Objective is	
1.	Introduce students to the origin, history, philosophy, and fundamental concepts of Yoga.
2.	Familiarize students with the different schools of Yoga, its aims, objectives, and the importance of prayer in Yogic practice.
3.	Develop awareness of the rules, regulations, and safety precautions to be followed during Yogic practices.
4	Enable students to learn and practice Suryanamaskara and selected Yogasanas with proper techniques for improving physical and mental well-being.
5	Promote a healthy lifestyle by encouraging regular Yogic practice, correcting misconceptions about Yoga, and fostering positive health, self-discipline, and overall wellness.

Syllabus	**28 Hours**
I. Introduction of Yoga: Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, Aim and Objectives of yoga, **II. Prayer:** importance of prayer Brief introduction of yogic practices for Yogic practices for common man to promote positive health, **III. Rules and regulations**: Rules to be followed during yogic practices by practitioner Suryanamaskara: Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar12 count, 2 rounds, **IV. Misconceptions of yoga**: Yoga its misconceptions, Difference between yogic and non yogic practices **V. Different types of Asanas-1:** Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana, Sitting 1. Padmasana, 2. Vajrasana, Standing 1. Vrikshana, 2. Trikonasana, Prone line 1. Bhujangasana, 2. Shalabhasana, Supine line 1. Utthitadvipadasana, 2. Ardhahalasana I. Patanjali's Ashtanga Yoga: Patanjali's Ashtanga Yoga, its need and importance. Suryanamaskar12 count 4 rounds. **VI. Different types of Asanas-2**: Sitting 1. Sukhasana, 2. Paschimottanasana, Standing 1. Ardhakati Chakrasana, 2. Parshva Chakrasana, Prone line 1. Dhanurasana Supine line 1. Halasana, 2. Karna Peedasana **VII. Kapalabhati**: Meaning, importance and benefits of Kapalabhati. 40 strokes/min 3 rounds **VIII. Pranayama**: 1. Suryanuloma –Viloma, 2. Chandranuloma-Viloma, 3-Suryabhedana, 4-Chandra Bhedana,	

Course Learning Outcomes: Upon successful completion of this course, the student will be able to:	
1.	Explain the origin, history, philosophy, objectives, and different schools of Yoga, along with its role in promoting holistic health and well-being.
2.	Understand and apply the rules, regulations, and ethical practices associated with Yogic exercises, including the significance of prayer and Suryanamaskara.
3.	Demonstrate the correct techniques of selected Yogasanas, such as sitting, standing, prone, and supine postures, while observing appropriate precautions.
4	Analyze the physical, mental, and therapeutic benefits of Yogic practices and distinguish between authentic Yogic practices and common misconceptions about Yoga.
5	Adopt Yoga as a regular lifestyle practice to enhance physical fitness, mental wellness, discipline, and overall quality of life.

Text books:

1. George Feuerstein : the yoga Tradition (its history, literature, philosophy and practice)
2. Sri Ananda: The complete Book of yoga Harmony of Body and Mind (Orient paper Backs: Vision Books Pvt.Ltd..1982.
3. B.K.S lyenkar: Light on the Yoga sutras of Patanjali (Haper Collins Publications India Pvt.Ltd.New Delhi.)
4. Science of Divinity and Realization of Self Vethathiri Publication, (6-11) WCSC, Erode

Reference books / Manuals:

1. Principles and Practice of Yoga in Health Care, Publisher: Handspring Publishing Limited. ISBN:9781909141209, 978190914209
2. Basavaraddi I V: Yoga in School Health, MDNIY New Delhi. 2009
3. Dr. HR. Nagendra: Yoga Research and application (Vivekanada Kendra Yoga Prakashana Bengalore)
4. Dr. Shirley Telles: Glimpses of Human Body (Vivekanda Kendra Yoga Prakashana Bengalore).

ASSESSMENT STRUCTURE:

This course is having only Continuous Internal Assessment (CIE) marks of 100. A student shall obtain a minimum of 40% marks out of 100 to qualify in the course.

Sl. No	Activity	Max. Marks
1.	Attendance	20
2.	Quizzes /Assignment – 2, each of 25marks	50
3.	Report/ Participation Certificate	30
Total		**100**

Semester-III/IV					
MUSIC **Category: MNC**					
Course Code	:	**B25BCA309E / 409E**	CIE	:	100 Marks
Teaching Hours L : T : P : S	:	0:0:0:28	SEE	:	--
Total Hours/Semester	:	28	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	--

Course Learning objectives: The course Will enable the students to:	
1.	Identify the major traditions Of Indian music. through notations and aurally.
2.	Analyse the compositions with respect to musical and lyrical content
3.	Demonstrate an ability to use music technology appropriately in a variety of setting.

Syllabus	**28 Hours**
I. Preamble: Contents of the curriculum intend to promote music as language to develop an analytical, Creative and intuitive Understanding. For this the student must experience music through study and direct participation in improvisation and composition. Origin of the Indian Music: Evolution of the Indian music system, Understanding Of Shruthi, Nada, Swara, Lay-a, Raga Talau Mela. **II. Compositions:** Introduction to the types of composition in Carnatic Music. Geethe, lath i, Swara, Swarajathi, Varna, Krithi. and Thillana, Notation System. **III. Composers:** Biography and contributions Of purandaradasa. Thyagaraja, Mysoro Vasudevacharya. **IV**. **Music Instruments**: Classification and construction of string instruments, Wind instrutnents. E*rcussion instruments, Idiophones (Ghana Vaadya), Examples of each class of Instrum ents **V**. **Abhyasa Gana:** Singing the swara exercises (Sarale Varase Only). dotation writing for Sarale Varase and Suladi Saptha Tala (Only in Mayamalavagowla Raga), Singing 4 Geethe in M alahari. And one jathi Swara One Krithi in a Mela raga	
Course Learning Outcomes: Upon successful completion of this course, the student will be able to:	
1.	Discuss the Indian system Of music and relate it to Other genres (Cognitive domain)
2.	Experience the emotions Of and develop empathy (AffRtive Domain)
3.	Ressond to queries on various patterns in a composition (Psycho Motor Domain)

ASSESSMENT STRUCTURE (CIE Only):

This course is having only Continuous Internal Assessment (CIE) marks of 100. A student shall obtain a minimum of 40% marks out of 100 to qualify in the course.

Sl. No	Activity	Max. Marks
1.	Attendance	20
2.	Quizzes /Assignment – 2, each of 25marks	50
3.	Report/ Participation Certificate	30
Total		**100**

Text Books

1. Vldushi Vasantha Madhavi, “Theory of Music” Prism Publication, 2007
2. T Sachidevi and T Sharadha “Karnataka Sangeetha Dharpana” Vol. 1 (English). Shreenivaas Prakaashana, 2018

References:

1. Lakshminarayana Subramaniam. Viji Subramanaim. -Classical Music of India: A Practical Guigee, Tranquer, 2018.