A.D.MCOLLEGEFOR WOMEN (AUTONOMOUS),

(Accredited With 'A' Grade By NAAC 4th Cycle)

(Affiliated to Bharathidasan University, Tiruchirappalli)

NAGAPATTINAM- 611 001

PG DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS

B.C.A

Batch (2024-2027)

PG DEPARTMENT OF COMPUTER SCIENCE

B.C.A COURSE STRUCTURE UNDER CBCS

(2024-2027 Batch)

OBE ELEMENTS

Programme Educational Objectives (PEO):

PEO 1:	To impart knowledge in advanced concepts and applications in different fields of computer Science.
PEO 2:	To prepare students to enter into professional courses.
PEO 3:	To educate students to occupy important positions in Software's, MNCs and Industries
PEO 4:	To equip students with skills to excel in their future careers. To enable students to take up challenging jobs.
PEO 5:	To prepare students to enter Masters Programme like M.Sc.,(Computer Science),M.Sc., (Information Technology) and pursue professional programmes like M.C.A. etc.

Programme Outcomes (PO):

On completion of the course the learner will be able

PO 1:	Academic Excellence: Academic excellence through effective delivery of course contents. Goal-Oriented and Life-Long Education: Setting short term, medium, and long term goals and achieving them in a global competitive perspective.
PO 2:	Social Consciousness : Develop committed and socially responsible individuals and help them take up active and positive roles in society
PO 3:	Technical Knowledge: To find, utilize and create content using information technologies and the internet.
PO 4:	Entrepreneurial Development: They would develop business acumen, analytical skills, financial literacy necessary to appreciate the dynamic nature of commerce and industry
PO 5:	Research and practical knowledge: Using research knowledge and aptitude acquired in the course of study for solving problems and face modern day challenges. Project Work and Viva: To help them develop the ability to participate in academic discussions.

Programme Specific Outcomes (PSO):

On completion of the course the learner will be able

PSO 1:	Acquire skill and information not only about computer and information technology but also in organization and management. Prepare student for roles pertaining to computer applications and IT industry
PSO 2:	Develop programming skills, networking skills, learn applications, packages, programming languages and modern techniques of IT
PSO 3:	Learn programming language such as Java, C++, HTML, SQL, Dotnet, etc… Prepare the learners to get placed in reputed organisations
PSO 4:	Provide information about various computer applications and latest development in IT and communication system
PSO 5:	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ADM COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM
PG DEPARTMENT OF COMPUTER SCEINCE
CURRICULUM STRUCTURE – BCA (2024 - 2027)
(For I Year 2024 Batch onwards)

Part	Category of Courses	No. of Courses	Hrs	Total Credits
Part I	Language Courses (Tamil/Hindi/French/Arabic/ Sanskrit)	4	24	12
Part II	English Language Courses	4	24	12
Part III	Core Courses (CC) (T – 10, P – 5)	15	70	60
	Minor Course (T – 4 / 5 , P – 2/1)	6	24	16
	Discipline Specific Courses (DSC)	3	10	9
	Project	1	3	3
Part IV	Skill Enhancement Courses (SEC)	4	8	8
	Ability Enhancement Courses (AEC)	3	6	6
	Multi Disciplinary Courses (NME)	2	4	4
	Environmental Studies	1	2	2
	Value Education	1	2	2
	Soft Skill Development	1	2	2
	Summer Internship/Industrial Activity	0	0	2
Part V	Gender Studies	1	1	1
	Extension Activity (NCC/NSS/Sports/Any Other Activities)	0	0	1
	Total	46	180	140

EXTRA CREDIT SCHEME STRUCTURE – 2024 - 2027

Courses	Credits	Semester	Marks
Extra Credit Courses I(Professional English) ECPEA - ECC I - PROFESSIONAL ENGLISH FOR ARTS AND SOCIAL SCIENCES **(Tamil, English, History, Economics, Mathematics, CS, IT, BCA)** ECPEB - ECC I - PROFESSIONAL ENGLISH FOR COMMERCE AND MANAGEMENT **(Commerce & BBA)** ECPEC - ECC I - PROFESSIONAL ENGLISH FOR LIFE SCIENCES **(Zoology, Botany, Biochemistry & Marine)** ECPED - ECC I - PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES **(Physics, Chemistry & Geology)**	2	I	100
Extra Credit Courses II (Skill Course I – Add on)	2	II	100
Extra Credit Courses III(Skill Course II- Add on)	2	III	100
Extra Credit Courses IV(Skill Course III- Add on)	2	IV	100
Value added course I (Multidisciplinary)	2	V	100
Value added Course II (Same disciplinary)	2	VI	100
Total	**12**		

SCHEME OF EXAMINATIONS – 2024 Batch
BCA (2024 - 2027)
(For UG Science)

SEMESTER – I							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course I	LC I - Pothu Tamil I	6	3	3	25	75
Part II	English Course I	ELC I - General English I	6	3	3	25	75
Part III	Core Course I	CC I- C Programming	5	4	3	25	75
	Core Practical I	CP I- C Programming Lab	3	3	3	40	60
	First Minor Course I	FMC I - Mathematics I	4	3	3	25	75
	First Minor Course II	FMC II - Mathematics II	2	-	-	-	-
Part IV	Skill Enhancement Course I	SEC I – Computational Skills Lab	2	2	3	40	60
	VE	Value Education	2	2	3	25	75
*Extra Credit 1	Extra Credit I	Extra Credit Course I - Professional English		2	-	0	100
		No. of Courses –	**30**	**20+2**			

SEMESTER – II							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course II	LC II - Pothu Tamil II	6	3	3	25	75
Part II	General English Course II	ELC II - General English II	6	3	3	25	75
Part III	Core Course II	CC II - Data Structures using C++	5	4	3	25	75
	Core Practical II	CP II - Data Structures using C++ Lab	3	3	3	40	60
	First Minor Course II	FMC II - Mathematics II	2	2	3	25	75
	First Minor Course III	FMC III - Mathematics III	4	3	3	25	75
Part IV	Skill Enhancement Course II	SEC II - Internet Lab	2	2	3	40	60
	EVS	Environmental Studies	2	2	3	25	75
*Extra Credit II	Extra Credit II	Extra Credit Courses II (Skill Course I – Add on) **Data Entry Operator with DTP**		2	-	0	100
		No. of Courses –	**30**	**22+2**			

SEMESTER – III							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course III	LC III - Pothu Tamil III	6	3	3	25	75
Part II	General English Course III	ELC III - General English III	6	3	3	25	75
Part III	Core Course III	CC III- Java Programming	5	4	3	25	75
	Core Practical III	CP III - Java Programming Lab	3	2	3	40	60
	Second Minor Course I	SMC I - Elements of Accounting	4	3	3	25	75
	Second Minor Practical I	SMP I - Tally Lab	2	-	-	-	-
Part IV	Multi Disciplinary Course I	NME I **1. Multimedia Lab** 2. PC Package Lab	2	2	3	40	60
	Skill Enhancement Course III	SEC III - PHP Lab	2	2	3	40	60
*Extra Credit III	Extra Credit III	Extra Credit Courses III(Skill Course II- Add on)		2	-	0	100
		No. of Courses –	**30**	**19+2**			

SEMESTER – IV							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course IV	LC IV - Pothu Tamil IV	6	3	3	25	75
Part II	General English Course IV	ELC IV - General English IV	6	3	3	25	75
Part III	Core Course IV	CC IV - Advanced Database Management Systems	5	4	3	25	75
	Core Practical IV	CP IV - Advanced Database Management Systems Lab	3	3	3	40	60
	Second Minor Practical I	SMP I - Tally Lab	2	2	3	40	60
	Second Minor Course III	SMC II - Financial Management	4	3	3	25	75
Part IV	Multi Disciplinary Course II	NME II **1.HTML Lab** 2.Internet Lab	2	2	3	40	60
	Ability Enhancement Course I	AEC I - R Programming Lab	2	2	3	40	60
*Extra Credit IV	Extra Credit IV	Extra Credit Courses IV(Skill Course III- Add on) **Digital Literacy Lab**		2	-	0	100
		No. of Courses –	**30**	**22+2**			

SEMESTER – V							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part III	Core Course V	CC V - Operating System	6	5	3	25	75
	Core Course VI	CC VI - Computer Graphics	6	5	3	25	75
	Core Course VII	CC VII - Python Programming	6	5	3	25	75
	Core Practical V	CP V - Python Programming Lab	5	3	3	40	60
	Discipline Specific Elective I	DSE I – 1.**Computer graphics and Animation Lab** 2. Software Development Tools Lab	3	3	3	40	60
Part IV	Ability Enhancement Course II	AEC II - Data Visualization Tools Lab	2	2	3	40	60
	SSD	Soft Skill Development	2	2	3	25	75
	Summer Internship/Ind. Training	Internship	-	2			
*Extra Credit V	Extra Credit Courses V	Value added course I (Multidisciplinary) **Bio Informatics (Theory and Practical)**		2	-	0	100
		No. of Courses –	**30**	**27+2**			

SEMESTER – VI							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part III	Core Course VIII	CC VIII - Mobile Computing	5	5	3	25	75
	Core Course IX	CC IX - Computer Networks	5	5	3	25	75
	Core Course X	CC X - DotNet programming	5	5	3	25	75
	Core Course XI	CC XI - Project	3	3	3	40	60
	Discipline Specific Elective II	DSE II 1**. Dot Net Programming Lab** 2. Latex Lab	3	3	3	40	60
	Discipline Specific Elective III	DSE III **1. Android Lab** 2.UI/UX Design and Animation Lab using Open source Tools	4	3	3	40	60
Part IV	Skill Enhancement Course IV	SEC IV - GIMP Lab	2	2	3	40	60
	Ability Enhancement Course III	AEC III – IOT Lab	2	2	3	40	60
Part V	GS	Gender Studies	1	1	3	25	75
	Extension Activities	(NCC/NSS/Sports/Any Other Activities)	-	1	-	-	-
*Extra Credit VI	Extra Credit Courses VI	Value added Course II (Same disciplinary) **Data Science**		2	-	0	100
		No. of Courses –	**30**	**30+2**			

Grand Total – Credit 140 & Extra Credit 12

Semester-I / Core Course-I (CC I)	**C Programming**	**Course Code:**
Instruction Hours: 5	**Credits: 4**	**Exam Hours: 3**
Internal Marks:25	**External Marks:75**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember

K2-Understanding

K3-Apply

K4-Analyze

K5-Evaluate

K6-Create

Course Objectives:

- To obtain knowledge about the structure of the programming language C
- To develop the program writing and logical thinking skill**.**
- To impart the knowledge about pointers which is the backbone of effective memory handling
- To study the advantages of user defined data type which provides flexibility for application development
- To teach the basics of Pre-processors available with C compiler

UNIT	CONTENT	HOURS
UNIT I	FUNDAMENTALS OF PROGRAMMING: Computer Basics- Algorithms – Simple Model of a Computer – Characteristics of Computers- Problem Solving Using Computers – Flow Chart – The Working of a Computer. Introduction To C Language: Identifiers, Keywords, Constants, Variables and data types, Access Modifiers, Data Type Conversions- Operators- Conditional Controls – Loop.	15
UNIT II	ARRAYS: One Dimensional Array - Two Dimensional Array – Character Arrays and Strings. FUNCTION: Introduction - Elements of User Defined Function - Definition of Functions - Return Values and their Types – Function Calls - Function Declaration - Category of Function - Nesting of Function - Recursion - Passing Arrays to Function - Passing Strings to Function – The Scope, Visibilityand Lifetime of Variables - Library functions.	15
UNIT III	STRUCTURES AND UNIONS: Defining Structure - Declaring Structure Variable - Accessing Structure Members Structure Initialization - Arrays of Structure - Arrays within Structures - Structures within Structures - Structures and Function - Union.	15

UNIT IV	POINTERS : Pointers - Declaration of Pointers - Accessing Variables through Pointers - Chain of Pointers - Pointer Expressions- Pointer Increments - Pointers with Arrays, Strings- Array of Pointers - Pointers with Functions - Pointers with Structures.	15
UNIT V	FILE MANAGEMENT IN C : Defining and Opening a File - Closing a File - Input / Output Operations on Files – Error Handling During I/O Operations - Random Access to Files - Command Line Arguments - Dynamic Memory Allocation.	15

Text Books:

1. V. Rajaraman, "Fundamentals of Computer ", Asoke k.Ghosh Publications, PHI Course Limited, 6th Ed., New Delhi,2011. UNIT I(A)
2. E. Balagurusamy, "Programming in C", Tata McGraw Hill, 8th Ed., New Delhi, 2016. UNIT I (B) to UNIT V.

Reference Books:

1. Byron S. Gottfried, "Programming with C", Tata McGraw Hill, 3rd Ed., New Delhi, 2010.
2. YashvantKanetkar, "Working with C", BPB Publication, 2nd revised edition, New Delhi, 2008.

Web-Resources:

https://www.w3schools.in/c-tutorial/ https://nptel.ac.in/courses/106104128/

Course Outcomes:

On completion of the Course learner should be able to,

- Understand the basic terminology of algorithm, flow chart and gain awareness used in computer programming.
- Design programs involving the various concepts like decision structures, loops, functions of C language.
- Demonstrate the single, multi-dimensional arrays, String functions and user defined functions.
- Compare the structure and union of C and apply it to construct array of structures and structure function.
- Understand the dynamics of memory by the use of pointers and pointers with functions.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-I/ Core Practical I (CP I)	C Programming Lab	Course Code:
Instruction Hours:3	Credits:3	Exam Hours:3
Internal Marks :40	External Marks:60	Total Marks: 100

Knowledge Level

K1-Acquire/Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To develop skills in implementing algorithms through the programming Language C
- To explore the features of C by applying sample problems.
- The students will be able to enhance their analyzing and problem solving skills
- To learn problem solving techniques.
- To teach the student to write programs in C and to solve the problems.

List of Practicals:

1. Exercise using different data types
2. Exercise using different operators
3. Exercise to implement control structures
4. Exercise using loop statements
5. Exercise using arrays
6. Exercise to explore built-in functions
7. Exercise to create user defined function
8. Exercise using structures
9. Exercise using pointers
10. Exercise to work with files

Course Outcomes

On completion of the course the learner will be able to

- Understanding a functional hierarchical code organization.
- Ability to define and manage data based on problem subject domain.
- Ability to work with textual information, characters and strings.
- Ability to work with arrays of complex objects.
- Understanding a concept within the frame work of functional model.

Semester-I/ Skill Enhancement Course - I (SEC I)	**Computational Skills Lab**	**CourseCode:**
Instruction Hours:2	**Credits:2**	**ExamHours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Office tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.
- Give students an in-depth understanding of why computers are essential components in business, education and society.
- Provide foundational or "computer literacy" curriculum that prepares students for life-long learning of computer concepts and skills.
- To acquire knowledge on editor, spread sheet and presentation software.
- To train them to work on the comment based activities in MS-office system

List of Practical's:

MS-WORD

1. Text Manipulations
2. Usage of Numbering, Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Picture Insertion and Alignment
5. Mail Merge Concept
6. Copying Text and Picture
7. Creation of Tables, Formatting Tables
8. Splitting the Screen

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Aligning, Editing Data in Cell
3. Date and Time Function
4. Mathematical Functions
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Drawing Borders Around Cells
7. Creation of Charts and Changing Chart Type

MS -POWER POINT

1. Working With Slides
2. Creating, saving, closing presentation
3. Adding Headers and footers
4. Changing slide layout
5. Working fonts and bullets
6. Inserting Clip art: working with clipart
7. Applying Transition and animation effects
8. Run and Slide Show

Course Outcomes:

On completion of the Course, learner should be able to

- To perform documentation activities
- To execute accounting operations
- To enhance presentation skills
- To work on Document Management Systems
- Format Text, Paragraphs, and sections and to create and manage documents

Semester-I / VE	**Value Education**	**Course Code:**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks :25	**External Marks:75**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember

K2-Understanding

K3-Apply

K4-Analyze

K5-Evaluate

K6-Create

Course Objectives:

- To understand the philosophy of life and values through Thirukural
- To analyse the components of values education to attain the sense of citizenship
- To understand different types of values towards National Integration and international understanding
- To learn yoga as value education to promote mental and emotional health
- To understand human rights, women rights and other rights to promote peace and harmony

UNIT	**CONTENT**	**HOURS**
UNIT I	PHILOSOPHY OF LIFE AND SOCIAL VALUES: Human Life on Earth (Kural 629) -Purpose of Life (Kural 46) -Meaning and Philosophy of Life (Kural 131, 226) -Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).	6
UNIT II	HUMAN VALUES AND CITIZENSHIP: Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values- Character Formation – Components of Value education- A P J Kalam's ten points for enlightened citizenship- The role of media in value building.	6

UNIT III	VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT: Constitutionalor national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith -Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the same- National Integration and International Understanding.	6
UNIT IV	YOGA AND HEALTH: Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.	6
UNIT V	HUMAN RIGHTS: Concept of Human Rights: Indian and international perspectives- Evolution of Human Rights- definitions under Indian and International documents -Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty ad Dignity- Right to equality- Right against exploitation- Cultural and Educational Right- Economic Rights- Political Rights- Social Rights - Human Rights of Women and Children – Peace and harmony.	6

Text Books:

Thirukkural with General English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004.

V.R. Krishna Iyer, Dialetics and Dynamics of Human Rights in India, Tagore Law Lectures.

Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.

SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, Prem Kalyan Publications, Sedaptti, 1999.

Reference Books:

1. Grose. D. N – “A text book of Value Education’ New Delhi (2005)
2. Gawande . EN – “Value Oriented Education” – Vision for better living. New Delhi (2002) Saruptsons
3. Brain Trust Aliyar- “Value Education for Health, Happiness and Harmony” Erode (2004) Vethathiri publications

Web Resources:

https://www.studocu.com/in/document/thiruvalluvar-university/bcom-general/value-education-study-material-1/24751487

https://www.dypiemr.ac.in/images/value-added-courses/vac/Content-for-Value-Education.pdfhttps://mrcet.com/downloads/digital_notes/CSE/Mtech/I%20Year/Value%20education%20Digital %20notes.pdf

Course Outcomes:

After completion of the course, the student will be able to:

- Apply the values in thirukural to be peaceful, dutiful and responsible in family and society
- Develop character formation and sense of citizenship
- Be secular, self-control, sincere, respectful and moral.
- Master yoga, asana and meditation to promote mental health
- Be attitudinal to follow the constitution alrights

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-II/ Core Course-II (CC II)	Data Structure using C++	Course Code:
Instruction Hours: 5	Credits: 4	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- To give the concepts of object oriented programming and to impart the programming skills in C++.
- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand dynamic memory management techniques
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- Demonstrate the use of various OOPS concepts with the help of programs

UNIT	CONTENT	HOURS
UNIT I	Object Oriented Programming Paradigm - Basic Concepts and Benefits of OOP – Object Oriented Language - Application of OOP - Structure of C++ - Applications of C++ - Function Prototyping - Call by Reference - Return by Reference - Inline Functions – Default Arguments - Constructor Arguments- Function Overloading - Friend and Virtual Functions - Classes and Objects- Member Functions - Nesting of Member Functions – Private Member Functions - Memory Allocation of Objects - Static Data Members –Static Member Functions - Arrays of Objects – Objects as Function Arguments	15
UNIT II	CONSTRUCTORS& INHERITANCE Parameterized Constructors – Multiple Constructors - Constructor with Default Parameters - Copy and Dynamic Constructors -Destructors - Operator Overloading –Defining Derived Classes - Single Inheritance - Multiple Inheritance – Hybrid Inheritance -Virtual Base Class - Abstract classes – Constructors In Derived Class -Member Classes - Nesting of Classes.	15
UNIT III	LINEAR DATA STRUCTURES: Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists – Polynomial Manipulation -Stack ADT – Queue ADT - Evaluating arithmetic expressions.	15

UNIT IV	NON-LINEAR DATA STRUCTURES: Trees – Binary Trees – Binary tree representation and traversals – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth- first search - Connected components. SORTING and SEARCHING: Sorting algorithms: Insertion sort - Quick sort - Merge sort - Searching: Linear search –Binary Search.	15
UNIT V	History of Bioinformatics – Goal of bioinformatics as a separate discipline – Emerging branches of Bioinformatics- NCBI PubMed- Genbank, Fasta and Swiss-Prot formats – Sequence Databases : Nucleotide Sequence – Protein Sequence Databases – SWISS-PROT, Protein Structure Visualization Tools: RasMol, Swiss PDB Viewer- Database searching tools– BLAST and FASTA algorithms – Various versions of basic BLAST and FASTA.	15

Text Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", TMG, 8th Ed., New Delhi, 2017.
2. Seymour Lipschutz, "Data Structures", Tata McGraw Hill Publishing Company Limited, Revised 5th edition, New Delhi, 2014. UNITS: III, IV & V.
3. D.Mount, Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press, New York. 2004
4. A.D.Baxevanis and B.F.FrancisOuellellette, Bioinformatics- A Practical Guide to the Analysis of Genes and Proteins, Wiley India Pvt Ltd, New Delhi, 2009

Reference Books:

1. Robert Lafore, "Object Oriented Programming in Microsoft C++", Galgotia Publications, 4thedition, New Delhi, 2000.
2. BjarneStroustrup, "The C++ Programming Language", Addison- Wesley, 4th edition., 2013

Web-Resources:

https://www.w3schools.com/**cpp**/ http://nptelvideos.com/video.php?id=2187&c=28

Course Outcomes:

On completion of the Course, learner should be able to

- Learn the basic concepts in Object-Oriented programming.
- Develop programming skills by applying Object-Oriented programming.
- Discuss the function overloading and Member Functions.
- Understand the concepts of Constructors and Inheritance.
- An Ability to incorporate Exception Handling in Object-Oriented programs and analyze File Input/output Streams.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-II/ Core Practical-II (CP II)	Data Structures Using C++ Lab	Course Code:
InstructionHours:3	Credits:3	ExamHours:3
Internal Marks :40	External Marks:60	Total Marks: 100

Knowledge Level

K1-Acquire/Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To understand the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand how to produce object-oriented software using C++
- To familiarize the students with language environment.
- To implement various concepts related to language.
- Be able to understand the difference between object oriented programming and procedural oriented language and data types in C++.

List of Practicals:

1. Program to find factorial of a given number.
2. Program to illustrate the call by value and call by reference
    a) Program to find the largest of three numbers using inline function.
    b) Program to find mean of 'N' numbers using friend function.
3. Program to find volume of cube, cylinder and rectangular box using function overloading.
4. Matrix Addition and Multiplication operations
5. To find an element using Sequential and binary search.
6. Perform the following types of Sorting: i. Bubble sort ii. Insertion sort iii. Selection sort
7. To PUSH and POP an element from STACK.
8. To Insert and Delete an element from QUEUE.
9. To insert and delete a node in a linked list.
10. Explore the sitemap of NCBI and PUBMED and find the official gene symbol, alias
11. name, chromosome number and ID for a particular sequence.
12. Retrieve the Genbank entry with an accession number AF375082 and save the sequence in FASTA format.
13. Retrieve Protein sequences from Protein Data Bank (PDB)and analyze the primary, secondary and tertiary protein structure using tools
14. Retrieve nucleotide sequences and perform local alignment and global alignment using EMBOSS

Course Outcomes:
On completion of the Course, learner should be able to

- After the completion of this course, the students will be able to develop applications.
- Introduces Object Oriented Programming concepts using the C++ language
- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Evaluate the I/O Introduces exception handling.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-II/ Skill Enhancement Course II (SEC II)	**Internet Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Evaluate e-mail software
- Find the Web-based e-mail services
- Use search engines and directories effectively
- Find, evaluate, and use online information resources
- Create HTML documents and enhance them with browser extensions

List of Practicals:

1. E-Mail Creation
2. Using Search Engines
3. E-Pay
4. Online Shopping
5. Submitting Forms Online
6. Online converter (pdf, word, image, etc.,)
7. Design a Web site on your college.
8. Prepare the invitation using Online Software.

Course Outcomes:

On completion of the Course, the learner will be able to

- Students in both the traditional and Internet classes should use Email within Web to communicate with the instructor.
- List important consumer concerns regarding purchasing items online
- To learn to purchase through online shopping
- To learn online conversion pages.
- To learn to submit online applications

Semester-II	Environmental Studies	Course Code:
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Knowledge Level

K1-Acquire / Remember

K2-Understanding

K3-Apply

K4-Analyze

K5-Evaluate

K6-Create

Course Objectives:

- To develop a world population that is aware of and concerned about the environment and its associated problems
- To develop the knowledge
- To ensure the Skills and attitudes
- To develop motivations
- Develop commitment to work individually and collectively towards solutions of current problems and prevention.

UNIT	CONTENT	HOURS
UNIT I	The Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness.	6
UNIT II	Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as resources, land degradation, man induced Landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	6

UNIT III	Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers Energy flow in the ecosystem Ecological succession. Food chains, food webs and ecological pyramids Introduction, types, characteristic features, structure and function of the following ecosystem:- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)	6
UNIT IV	Biodiversity and its conservation Introduction – Definition : Genetic, species and ecosystem diversity Bio geographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, National and local levels India as a mega-diversity nation Hot-spots of biodiversity Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	6
UNIT V	Environmental Pollution Definition Causes, effects and control measures of: a. Air Pollution b. Water Pollution c. Soil Pollution d. Marine Pollution e. Noise pollution f. Thermal Pollution g. Nuclear hazards Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution Pollution case studies Disaster management: floods, earthquake, cyclone and landslides. Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety	6
UNIT VI	Social Issues and the Environment From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation Public awareness.	6

UNIT VII	Human Population and the Environment Population growth, variation among nations. Population explosion – Family Welfare Programmes Environment and human health Human Rights - Value Education HIV/ AIDS - Women and Child Welfare Role of Information Technology in Environment and human health .Case studies.	6
UNIT VIII	Field Work Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain	-

Reference Books:

Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.

1. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013,India, E-mail: mapin@icenet.net(R)
2. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
3. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
4. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
5. De A.K. Environmental Chemistry, Wiley Eastern Ltd
6. Down to Earth, Centre for Science and Environment (R)
7. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
8. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
9. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. CambridgeUniversity Press 1140 p.
10. Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub.House, Delhi 284 p.
11. Mckinney, M.L. &Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
12. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
13. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
14. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
15. Rao MN &Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication

Co. Pvt Ltd 345

16. Sharma B.K. 2001 Environmental chemistry GoelPubl House, Meerut.

17. Survey of the Environment, The Hindu (M).

18. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science(TB)

19. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).

20. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB)

Web-Resources:

http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20Rules,%202004.pdf.

Course Outcomes:

On completion of the Course, learner should be able to

- Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Reflect critically about the ireless and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Understand the transnational character of environmental problems and ways of Addressing them, including interactions across local to global scales.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

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W-Weakly Correlated

N – No Correlation

Semester-II -Extra Credit Course II (Skill Course I – Add on)	**Data Entry Operator with DTP**	**Course Code:**
Instruction Hours:	**Credits:2**	**Exam Hours:**
Internal Marks:	**External Marks:100**	**Total Marks:Grade**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To understand the basics of computers.
- To develop skills in computer software.
- To gain knowledge of Microsoft Office tools such as Word, Excel, and PowerPoint.
- To develop skills in typing and data entry.
- To learn to use file management software for data organization.

DATA ENTRY OPERATOR **Marks:40**

UNIT I:

Basics of Computer

Input Devices

- Keyboard
- Mouse
- Trackball
- Scanner
- Barcode reader
- Digitizer
- OCR,MICR

Output Devices

- Monitor
- Printers
- Plotters
- Soundcard and speakers
- System Software and Application Software
- Computer Language
- Compiler and Assembler

UNIT II:

Formatting Documents

- ➢Working with text
- ➢Formatting Paragraphs
- ➢Creating Bulleted and Numbered Lists
- ➢Spelling and Grammar

UNIT III:

Formatting Worksheets

- ➢Formatting Toolbar
- ➢Formatting Cells
- ➢Formatting Columns and Rows
- ➢Protect and Unprotect Worksheets

DESKTOP PUBLISHING LAB **Marks:60**

MS-Windows

- Introduction to Computer
- Computer Basic
- Creating Folder
- Directories

PageMaker

- Page Layout, Word Wrapping
- Grouping, Merging two or more files
- Creating columns, Tab settings
- Paragraph settings, Fonts, Mixing Text & Graphics

CorelDraw

- Logo Designing, Frame Settings
- Graphical Tools, Bitmap & Shadow Effects
- Special Effects such as Perspective
- Blending, Text Settings into objects
- Alignment Setting
- Tabs, Power Line
- Power Clip
- Contour

Photoshop

- Marquee Tool
- Magnetic Tool
- Slice Tool
- Patch Tool
- CloneStamp Tool
- Gradient Tool

- Smudge Tool
- Blur Tool,
- Text Tool
- Fill, Stroke Option
- Group, Ungroup

Course Outcomes:

- Identify different computer components, install and setup operating system and related software in a computer following safety precautions.
- Create, format and edit document using Word processing application software.
- Create, format, edit and develop a workbook by using Excel.
- Edit images/photos by using Paint and Office Picture Manager Application software.
- Create and customize slides for presentation by using Power Point.

Semester-III / Core Course III (CC III)	Java Programming	Course Code:
Instruction Hours: 5	Credits: 4	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

Programming in the Java programming language,

- Knowledge of object-oriented paradigm in the Java programming language,
- The use of Java in a variety of technologies and on different platforms.
- To Learn Why Java is useful for the design of desktop and web applications.
- To learn how to implement object oriented designs with Java.
- To identify Java language components and how they work together in applications.

UNIT	CONTENT	HOURS
UNIT I	JAVA Evolution: History - Features - Java differs from C and C++ -Java and Internet - Java and WWW - Web Browsers. Overview of Java Language: Introduction - Simple Java program - Structure- Java tokens- Statements - Java virtual Machine.	15
UNIT II	Constants -Variables- Data types - Operators and expressions -Decision making and Branching: Simple If Statement, the IF…Else statement, The Else... If ladder, The Switch Statement, The? : Operator, Decision making and looping: The While statement, the do Statement - The for Statement - Jumps in loops - labeled loops - Classes, Objects and Methods.	15
UNIT III	Arrays, Strings and Vectors – Interfaces- Multiple Inheritance – Packages: Putting classes together Multi-Threaded Programming. Managing Errors and Exceptions – Applet Programming– Graphics programming: The Graphics class-Lines and rectangles-Circles and ellipses-Drawing arcs-Drawing polygons- Line graphs-Using Control loops in applets-Drawing Bar charts.	15
UNIT IV	Files: Introduction – concept of streams – Stream classes – Using stream – I/O classes – File class – I/O Exceptions – creation of files – Reading / Writing characters/ Bytes – Handlingprimitive data types – Random Access Files.	15

UNIT V	Various definitions of bioinformatics, history of bioinformatics, applications of bioinformatics- Types of Databases Biological databases: Primary databases – GenBank, Protein sequence databases – Swissprot,Blossu- Structural databases – PDB, Bibliographic databases:-Pubmed,Translate tool using DNA,RNA Prediction Tool.	15

Text Book:

1. E. Balaguruswamy, Programming with JAVA -A Primer, McGraw HillProfessional,6th edition,2015.

Reference Books:

1. Herbert Schildt, Java: The CompleteReference, McGraw Hill Professional,7th edition,2017.
2. Robert Sedgewick&Kevin Wayne, Introduction to Programmingin Java, Addison Wesley,2017.

Web - Resources:https://www.tutorialspoint.com/java/index.htmhttps://www.javatpoint.com/java-tutorial

Course Outcomes:

On Completion of the course the student should be able to

- Use an integrated development environment to write
- Compile and run
- Test simple object oriented java programs.
- Read and make elementary modifications to Java programs that solve real world problems
- Validate input in a Java Program

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-III/Core Practical III (CP III)	**Java Programming Lab**	**Course Code:**
Instruction Hours:3	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire/Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objective:

- Understand fundamentals of programming such as variables, conditional and iterative execution, API's etc.
- Understand fundamentals of object oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Have the ability to write computer programs to solve specific problems.
- Be able to use the Java SDK environment to create, debug and run Java programs.
- To implement front end and back end of an application

List of Practicals:

1. Exercises using classes and objects
2. Exercises using Control Statements
3. Exercises using different Inheritance
4. Exercises using Mouse Events
5. Exercises to implementing the font class method
6. Exercises to implement Exception handling
7. Exercises using Interfaces
8. Exercises to illustrate the Thread Priority
9. Retrieve nucleotide sequences and perform pair wise and multiple sequence alignment using BLAST tool and analyze the output.
10. Convert gene sequence into its corresponding amino acid sequence using Translate Tool
11. Convert RNA gene sequence into its corresponding amino acid sequence using RNA prediction Tool

Course Outcomes:

On completion of the Course, learner should be able to

- Implement Object Oriented programming concept using basic syntax's of control Structures, strings and function for developing skills of logic building activity.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- Demonstrate show to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
- Demonstrate understanding and use of different exception handling mechanisms and concept to multithreading for robust faster and efficient application development.

Semester- III / Second Minor Course –I (SMC I)	**Elements of Accounting**	**Course Code:**
Instruction Hours:4	**Credits:3**	**Exam Hours:3**
Internal Marks :25	**External Marks:75**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- To provide the basic knowledge of the financial accounting including double entry book keeping.
- Preparation of journal subsidiary book ledger trail balance and balance sheet.
- To introduce students to Accounting, stressing its importance in today's business world.
- To help students understand the main concepts and principles of Accounting.
- To provide students with a theoretical basis upon which they will develop their knowledge in other areas of accounting.

UNIT	CONTENT	HOURS
UNIT I	**ACCOUNTING AND BOOK KEEPING** Meaning of Accounting and Book keeping - Objectives – Accounting Concepts and Conventions – Principles of Double Entry – Kinds of Account – Journal and Ledger Accounts.	12
UNIT II	**SUBSIDIARY BOOKS** Purchases Book, Sales Book, Purchase Returns Book, Sales Returns, Bills Receivable Book, Bills Payable Book, Petty Cash Book and Journal Proper –Cash Book – Single Column only.	12
UNIT III	**TRAIL BALANCE** Trail Balance – Rectification of Errors – Suspense Account – Bank Reconciliation Statement.	12
UNIT IV	**FINAL ACCOUNTS** Final Accounts – Trading Account, Profit and Loss Account , Balance Sheet – Opening, Adjusting and Closing Entries.	12
UNIT V	**DEPRECIATION AND PROVISIONS** Depreciation and Provisions - Methods of Depreciation - Straight Line Method and Diminishing Balance Method.	12

Text Book:

T.S.Reddy & Dr. A.Murthy, Financial Accounting Marghum Publications-2015.

Reference Books:

1. Advanced Accountancy by Shukla and Grewal
2. Advanced Accountancy by R.L. Gupta and Radhaswamy

Web-Resources:

https://www.tutorialspoint.com/accounting_basics/cost_accounting_elements_of_cost.html
http://www.ddegjust.ac.in/studymaterial/bba/bba-104.pdf

Course Outcomes:
On completion of the Course, the learner will be able to

- Preparing financial statements in accordance with appropriate standards.
- Prepare ledger accounts using double entry bookkeeping and record journal entries accordingly.
- Interpreting the business implications of financial statement information
- Communicating complex ideas in writing and through oral presentations
- Working effectively in diverse team settings. Effectively coordinating and motivating a group to achieve its best output

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-III/Second Minor Practical – I (SMP I)	**Tally Lab**	**Course Code:**
Instruction Hours:2	**Credits:-**	**Exam Hours: -**
Internal Marks : -	**External Marks: -**	**Total Marks: -**

Knowledge Level

K1-**Acquire/ Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objective:

- To acquaint students with the accounting concept, tools and techniques influencing business organization
- Student will learn to create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software
- Accounting with Tally certificate course is not just theoretical program, but it also includes continuous practice, to make students ready with required skill for employability in the job market.
- Online help and support: Tally offers an online support centre with features that users can access.
- Inventory management: Tally has built-in inventory management software that helps manage stocks and billing.

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List of Practicals:

1. Architecture and customization of Tally
2. Configuration of Tally
3. Tally Screens and Menus
4. Creation of new company and groups
5. Preparation of voucher entries.
    a. Payment voucher
    b. Receipt voucher
    c. Sales voucher
    d. Purchase voucher
    e. Contra voucher
    f. Journal voucher
6. Ledger Creation
7. Preparation of Trail balance
8. Preparation of Profit and loss statement.
9. Preparation of Balance Sheet.
10. Preparation of Bank Reconciliation Statement

Course Outcomes:

On completion of the Course, the learner will be able to

- At the end of the course student should be able to use accounting and business terminology.
- The objective of financial reporting and related key accounting assumptions and principles.
- Student will do by their own create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software
- Students do possess required skill and can also be employed as Tally data entry operator.
- Enable students handle manufacturing concern accounting, service accounting and so on.

Semester-III/ Multi Disciplinary Course I (NME I)	**1. Multimedia Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**ExamHours:3**
Internal Marks:40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire/Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To understand about data compression techniques, image compression techniques like JPEG, video compression techniques like MPEG, and the basic concepts about animation.
- To offer the knowledge of creating and working with digital images.
- To manipulate them and to develop a presentation package using multimedia tools.
- To give an overall view of multimedia tools.
- To understand and differentiate text, image, video & audio.

Macromedia Flash

1. Create an animation to represent the growing Moon.
2. Create an animation to indicate a ball bouncing on steps.
3. To Simulate Movement of a Cloud
4. Create an animation with the following features.

   WELCOME

   a) Letters should appear one by one
   b) The fill color of the text should change to a different color after the Display of the full word.
5. To Change a Circle into a Square Using Flash.

GIMP (Photoshop Equivalent)

1. Cropping images using Lasso Tools
2. Designing Pictures using Paint Tools
3. Designing Text using Text Tools
4. Applying Layer Effects to Images and Texts
5. Designing an Employee or Student ID card
6. Designing a seasonal greetings
7. Design a photograph applying Filter effects
8. Design an invitation for a conference
9. Design a brochure or poster for a technical symposium
10. Design a Web banner for a website

Course Outcomes:

On completion of the Course, Students should be able to do

CO 1: To learn and understand technical aspect of Multimedia System
CO 2: Design and implement an animation for various themes.
CO 3: Prepare multimedia advertisement...
CO 4: Develop various Multimedia Systems applicable in real time.
CO 5: To develop multimedia application and analyze the performance of the same.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S- Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-III **Non Major Elective**	**2. Computation Skills Lab**	**Course Code:**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-**Acquire / Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objectives:

- Office tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.
- Give students an in-depth understanding of why computers are essential components in business, education and society.
- Provide foundational or "computer literacy" curriculum that prepares students for life-long learning of computer concepts and skills.
- To acquire knowledge on editor, spread sheet and presentation software.
- To train them to work on the comment based activities in MS-office system

List of Practical's:

MS-WORD

1. Text Manipulations
2. Usage of Numbering, Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Picture Insertion and Alignment
5. Mail Merge Concept
6. Copying Text and Picture
7. Creation of Tables, Formatting Tables
8. Splitting the Screen

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Aligning, Editing Data in Cell
3. Date and Time Function
4. Mathematical Functions
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Drawing Borders Around Cells
7. Creation of Charts and Changing Chart Type

MS -POWER POINT

1. Working With Slides
2. Creating, saving, closing presentation
3. Adding Headers and footers
4. Changing slide layout
5. Working fonts and bullets
6. Inserting Clip art: working with clipart
7. Applying Transition and animation effects
8. Run and Slide Show

Course Outcomes:

On completion of the Course, learner should be able to

- To perform documentation activities
- To execute accounting operations
- To enhance presentation skills
- To work on Document Management Systems
- Format Text, Paragraphs, and sections, and to create and manage documents

Semester- III / Skill Enhancement Course – III (SEC III)	**PHP Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-**Acquire/ Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objective:

- To acquire practical knowledge of the Server Side Scripting and database basics and to develop applications using PHP and MySQL.
- Learn how to take a static website and turn it into a dynamic website run from a database using PHP and MySQL.
- Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
- Learn how databases work and how to design one, as well as how to use PHP My Admin to work with MySQL.
- Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.

List of Practical's

1. Working with PHP operators
2. Working with different types of looping statements using php
3. Working with different types of array using php
4. Working with PHP functions
5. Working with PHP forms
6. PHP form validation
7. Working with PHP math/date function
8. Executing DML and DDL commands using MySQL
9. Joining tables
10. Retrieving data from table using PHP
11. Inserting data into table using PHP
12. Create an application using PHP and MySQL.

Course Outcomes:

Students will be able to

- Learn the environment of Server Side Script.
- Compare and contrast between Client Side Script & Server Side Script.
- Learn the use of control structures and numerous native data types with their methods.
- Make Database connectivity between Front End and Back End.
- Develop Dynamic Website that can interact with different kinds of Database Languages.

Semester-IV/ Core Course- IV (CC IV)	Advanced Database Management Systems	Course Code:
Instruction Hours:5	Credits:4	ExamHours:3
Internal Marks :25	External Marks:75	Total Marks: 100

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- Distinguish between data and information and Knowledge
- Distinguish between file processing system and DBMS
- Describe DBMS its advantages and disadvantages
- Describe Database users including data base administrator
- Describe data models, Schemas and instances.

UNIT	CONTENT	HOURS
UNIT I	Introduction: Database System Applications –Database Languages – Transaction Management – Database Architecture – Database users and Administrators - Relational Model: Structure of Relational Databases – Database Design – ER Model – The Entity-relationship Model–Constraints – Entity Relationship Diagrams	15
UNIT II	Relational Algebra Operations – Relational Languages: The Tuple Relational Calculus – The Domain Relational Calculus – SQL: Background – Data Definition – Basic Structure of SQL Queries– Set Operations – Aggregate Functions – Null Values – Nested Sub-Queries – Views – Modification of the Database.	15
UNIT III	Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce- Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – Database Security: Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.	15
UNIT IV	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments– Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation – Transaction Control statements.	15
UNIT V	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.	15

Text Book:

1. "DatabaseSystemConcepts",AbrahamSilberschatz,HenryF.Korth,.Sudarshan,TMH6thEdition(Units-I,II,)
2. "FundamentalsofDatabaseManagement Systems",AlexisLeon,MathewsLeon,VijayNicole Imprints Private Limited.(Unit–III)
3. "Database Systems Using Oracle" Nilesh Shah, 2nd edition, PHI.UNIT-IV: Chapters 1&11UNIT-V:Chapters 12,13&14)

Reference Books:

Text Book of RDBMS (Relational Database Management Systerms)-By Mrs Vidya H. Bankar, Mrs Deepa Shree K, Mehendale, Mrs Sujatha P.Patel

Web Resource:

http://www.svecw.edu.in/Docs%5CITIIBTechIISemLecDBMS.pdfhttp://www.kciti.edu/wp-content/uploads/2017/07/dbms_tutorial.pdf

Course Outcomes:

On completion of the Course, learner should be able to

CO1: Emphasize the need, role, importance and uses of data bases in application development

CO2: Design E-R modelling for a given situation and provide the foundation for development of relational
Database structure.

CO3: Identify the advantages of the database approach over the file based data storage system.

CO4:Distinguish between different models of file organizing, storing and using of data and understand the
Relational model and relational algebra operations.

CO5:Normalize the relational tables applying normalization rules and apply PL/SQL procedural interfaces
Statement on relational tables as per requirements.

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	M	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-IV/ Core Practical IV (CP IV)	Advanced Database Management Systems Lab	Course Code:
Instruction Hours:3	Credits:3	Exam Hours:3
Internal Marks :40	External Marks:60	Total Marks: 100

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To acquire skills in SQL statements with various constructs
- To acquire skills in PL/SQL Programming
- To practice with stored Objects, functions, procedures, trigger.
- Design different views of tables for different users and to apply embedded and nested queries.
- Design and implement a database for a given problem according to well-known design principles that balance data retrieval performance with data consistency.

SQL:

1. Table Creation with various data types and constraints.
2. DLL statements (CREATE, ALTER, DROP).
3. DML statements (Retrieval, Update, Delete, Insertion).
4. Arithmetic Functions.
5. Character and String Functions.
6. Group Functions.
7. Conversation Functions.
8. Date Functions.
9. JOINS (Self, Equi and Outer).
10. Sub queries and correlated sub queries.

PL/SQL:

1. Control Structures.
2. Simple and multiple loop structures.
3. Exception Handling.
4. Explicit and Implicit Cursors.
5. Triggers

Forms/Report:

1. Employee Pay bill preparation.
2. Student mark sheet preparation.
3. Inventory Control Processing.

MY SQL

1. Design an authentication web page in PHP with MySQL to check username and password.
2. Write a program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.

Course Outcomes:

On completion of the Course, Students should be able to do

- Design and implement a database schema for a given problem-domain
- Normalize a database
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors,packages
- Analyze and design a real database application.
- Develop and evaluate a real database application using a database management system.

Semester-IV/Second Minor Practical I (SMP I)	**Tally Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-**Acquire/ Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objective:

- To acquaint students with the accounting concept, tools and techniques influencing business organization
- Student will learn to create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software
- Accounting with Tally certificate course is not just theoretical program, but it also includes continuous practice, to make students ready with required skill for employability in the job market.
- Online help and support: Tally offers an online support center with features that users can access.
- Inventory management: Tally has built-in inventory management software that helps manage stocks and billing.

List of Practicals:

1. Architecture and customization of Tally
2. Configuration of Tally
3. Tally Screens and Menus
4. Creation of new company and groups
5. Preparation of voucher entries.
    a. Payment voucher
    b. Receipt voucher
    c. Sales voucher
    d. Purchase voucher
    e. Contra voucher
    f. Journal voucher
6. Ledger Creation
7. Preparation of Trail balance
8. Preparation of Profit and loss statement.
9. Preparation of Balance Sheet.
10. Preparation of Bank Reconciliation Statement

Course Outcomes:

On completion of the Course, the learner will be able to

- At the end of the course student should be able to use accounting and business terminology.
- The objective of financial reporting and related key accounting assumptions and principles.
- Student will do by their own create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software
- Students do possess required skill and can also be employed as Tally data entry operator.
- Students will be equipped with the basics of the accounting cycle through accounting software

Semester- IV / Second Minor Course II (SMC II)	**Financial Management**	**Course Code:**
Instruction Hours:4	**Credits:3**	**ExamHours:3**
Internal Marks :25	**External Marks:75**	**Total Marks: 100**

KnowledgeLevel

K1-Acquire/Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives

- To impart knowledge about basic concepts of financial management.
- To provide knowledge on cost of capital.
- To educate the students on capital structure.
- To inculcate knowledge about Leverages and working capital.
- To make the students to understand inventory management.

UNIT	Content	Hours
I	**Financial Management** Financial Management: Meaning and Scope – Objectives: Profit Maximization, Wealth Maximization – Functions – Financial Decisions – Time Value of Money: Present Value and Compound Value.	12
II	**Cost of Capital** Cost of Capital – Cost of Debt – Cost of Preference Share Capital – Cost of Equity – Cost of Retained Earnings – Weighted Average Cost of Capital..	12
III	**Capital structure** Capital Structure – Meaning and Features – Factors Determining Capital Structure – EBIT-EPS Relationship (AS-20) – Indifference Point of EBIT – Theories of Capital Structure: Net Income Approach, Net Operating Income Approach, MM Approach and Traditional Approach.	12
IV	**Leverages and Working Capital Management** Leverage – Meaning, Significance and Types – Operating Leverage – Financial Leverage – Combined Leverage - Working Capital Management – Determinants of Working Capital – Forecasting of Working Capital Requirements .	12
V	**Inventory Management** Inventory Management – Meaning – Types of Inventory – Purpose of Holding Inventory – Excess or Inadequate Inventory – EOQ – Levels of Stock: Reorder Level, Minimum Level and Maximum Level – Techniques – ABC, VED, FSN and HML Analysis.	12

Text Book:

Dr.Maheshwari S.N, Financial Management, Sultan Chand & Sons, New Delhi.

Reference Books:

- Dr. Prasanna Chandra, Fundamentals of Financial Management, TMH Publication, Mumbai, 2011.
- Khan & Jain, Financial Management, Tata Mcgraw Hill Publisher, New Delhi.
- Pandey. I.M., Financial Management, Sultan Chand & Sons., New Delhi.

- Dr. Ramachandran R. & Dr. Srinivasan R., Financial Management,Sriram Publications, Tiruchi, 2010.
- Rustagi. R.P., Financial Management: Theory, Concept and Problems, Galgotia.
- Sharma & Gupta, Financial Management, Kalyani Publication, Chennai.

Web Resources

- icmai.in
- https://examupdates.in
- https://gurukpo.com

Course Outcomes:

On completion of the course, students should be able to

CO1: Assess the basic concepts of financial management
CO2: Prepare cost of capital under different approaches.
CO3: Compute capital structure.
CO4: Identify working capital requirements and compile Leverages.
CO5: Compare different levels of stock.and techniques for holding inventories.

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	M	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-IV/ Multi Disciplinary Course II (NME II)	**1. HTML Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-**Acquire/Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objectives:

- To create Web application using tools and techniques used in industry.
- Create a web page.
- Create a link within a web page.
- Create a table within a web page.
- Insert heading levels within a web page.
- Insert ordered and unordered lists within a web page.

List of Practicals:

1. Create a web page to illustrate Html Body Tag and Pre Tags.
2. Create a web page to illustrate Text Font Tag.
3. Create a web page to illustrate Text Formatting Tag.
4. Create a web page using Marquee Tag.
5. Create a web page to illustrate the Image Tag
6. Create a web page to illustrate the Hyperlink Tag.
7. Create a web page to illustrate Order List and Unordered List Tag.
8. Create a web page to illustrate the table using Table Tag.
9. Create a web page to illustrate the Frame Tag.
10. Create a web page to illustrate the Form Tag.

Course Outcomes:

On completion of the Course, the learner will be able to

- Develop skills in analyzing the usability of a web site.
- Understand how to plan and conduct user research related to web usability.
- Understand basic concepts in HTML.
- Insert and format text.
- Implement a variety of hyperlinks to connect pages and communicate with users via email link.

Semester-IV/ Multi Disciplinary Course II (NME II)	**2. Internet Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Evaluate e-mail software
- Find the Web-based e-mail services
- Use search engines and directories effectively
- Find, evaluate, and use online information resources
- Create HTML documents and enhance them with browser extensions

List of Practical's:

1. E-Mail Creation
2. Using Search Engines
3. E-Pay
4. Online Shopping
5. Submitting Forms Online
6. Online converter (pdf, word, image, etc.,)
7. Design a Web site on your college.
8. Prepare the invitation using Online Software.

Course Outcomes:

On completion of the Course, the learner will be able to

- Students in both the traditional and Internet classes should use Email within Web to communicate with the instructor.
- List important consumer concerns regarding purchasing items online
- To learn to purchase through online shopping
- To learn online conversion pages.
- To learn to submit online applications

Semester- IV/Ability Enhancement Course I (AEC I)	**R-Programming Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objective:

- Master the use of the Rand R Studio interactive environment.
- Expand R by installing R packages.
- Explore and understand how to use the R documentation.
- Read Structured Data into R from various sources.
- Understand the different data types in R.
- Understand the different data structures in R.

List of Practicals:

1. R Program for Vector operations.
2. Create a R-list.
3. Implement matrices addition, subtraction and Multiplication.
4. Create a Data frame.
5. Create a factor object.
6. Import data, copy data from CSV file to R.
7. Create a R program for Mean median and mode.
8. Draw Bar charts and Pie charts in R.
9. Make visual representations of data for plotting functions in R.
10. Create a R program for Regression Model.

Course Outcomes:

On completion of the Lab, learner should be able to

- Download and install R and R Studio.
- Navigate and optimize the R integrated development environment (IDE) R Studio.
- Install and load add-in packages and import external data into R for data processing and statistical analysis.
- Learn the main R data structures–vector and data frame.
- Compute basic summary statistics.

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-IV/ Extra Credit Courses IV (Skill Course III – Add on)	**Digital Literacy Lab**	**Course Code:**
Instruction Hours:	**Credits:2**	**Exam Hours:**
Internal Marks :-	**External Marks:100**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Evaluate e-mail software
- Find the Web-based e-mail services
- Use search engines and directories effectively
- Find, evaluate, and use online information resources
- Create HTML documents and enhance them with browser extensions

List of Practicals:

1. E-Mail Creation
2. Using Search Engines
3. E-Pay
4. Online Shopping
5. Submitting Forms Online
6. Online converter (pdf, word, image, etc.,)
7. Design a Web site on your college.
8. Prepare the invitation using Online Software.

Course Outcomes:

On completion of the Course, the learner will be able to

- Students in both the traditional and Internet classes should use Email within Web to communicate with the instructor.
- List important consumer concerns regarding purchasing items online
- To learn to purchase through online shopping
- To learn online conversion pages.
- To learn to submit online applications

Semester-V / Core Course V (CC V)	**Operating Systems**	**Course Code:**
Instruction Hours:6	**Credits:5**	**ExamHours:3**
Internal Marks :25	**ExternalMarks:75**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- To gain the basic knowledge about the operating systems and its various schemes and services.
- To make students able to learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system.
- To provide students knowledge of memory management and deadlock handling algorithms
- To implement various algorithms required for management, scheduling, allocation and communication used in operating system.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system

UNIT	CONTENT	HOURS
UNIT I	INTRODUCTION: Meaning – Early Systems - Multiprogrammed Batch Systems – Real-Time Systems. Computer System Structures: Computer-System Operation - Storage Hierarchy - General System Architecture. Operating System Structures: System Components - System Calls - Virtual Machines - System Generation.	18
UNIT II	PROCESS MANAGEMENT: Processes - Process Concept - Operation on Processes - Inter-Process Communication. CPU Scheduling: Basic Concepts - Scheduling Algorithms - Real Time Scheduling. Process Synchronization: Background - Critical-Selection Problem – Semaphores. Deadlocks: System Model - Methods for Handling Deadlocks - Deadlock Avoidance - Recovery from Deadlock.	18
UNIT III	MEMORY MANAGEMENT: Background - Swapping - Paging - Segmentation with Paging. Virtual Memory: Demand Paging – Page Replacement - Allocation of Frames – Thrashing.	18
UNIT IV	File Concept - Access Methods – Directory Structures File-System Implementation: File-system Structure – Allocation Methods - Directory Implementation - Efficiency and Performance FILE - SYSTEM INTERFACE: File Concept - Access Methods – Directory Structures File-System Implementation: File-system Structure – Allocation Methods - Directory Implementation - Efficiency and Performance - Recovery. MASS STORAGE STRUCTURE: Disk Structure - Disk Scheduling - Swap-Space Management - Stable-Storage Implementation.	18
UNIT V	PROTECTION: Goals of Protection - Access Matrix - Capability Based Systems - Language-based Protection. Security: The Security Problem - Authentication - Security Systems and Facilities - Encryption. Distributed Systems: Distributed System Structures: Background – Distribution Coordination: Mutual Exclusion- Atomicity – Concurrency Control – Deadlock Handling- Election Algorithms.	18

Text Book:

Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Ed., John Wiley & Sons Inc., New Delhi 2013.

Reference Books :

1. Harvey M. Deitel, "An Introduction to Operating System", 3rd ed., Addison Wesley, New York, 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 4th ed., Prentice Hall, New Delhi, 2014.

E-Resources:

http://www.svecw.edu.in/Docs%5CCSEOSLNotes2013.pdf
http://www.crectirupati.com/sites/default/files/lecture_notes/Operating%20Systems%20Lecture%20Notes.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

- Understand the basic concept of Computer System and Operating System Structure
- Gain Knowledge of the fundamental aspects of process and processor managements with deadlocks and CPU scheduling
- Introduce memory and virtual memory techniques
- Understand files, directories and its accessing methods and its structures
- Ability to know mass storage devices and its scheduling

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V/ Core Course - VI (CC VI)	Computer Graphics	Course Code:
Instruction : 6	Credits: 5	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- To impart the basic principles of generating primitives, shapes, package development, interactive graphics, raster graphics, two and three dimensional graphics and their transformations.
- To provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations.
- To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
- The computer graphics course prepares students for activities involving in design, development and testing of modeling, rendering, shading and animation.
- This course provides an idea on hardware system architecture for computer graphics. This includes, but it is not limited to: graphics pipeline, fame buffers, and graphic co – processors

UNIT	CONTENT	HOURS
UNIT I	Basic Concepts:- Introduction – Uses of computer graphics – Display devices- CRT, Color CRT monitors– Inherentmemorydevices– Directviewstoragetube–Flatpaneldisplays–Three dimensional viewing devices, Raster scan system, Random scan system, aspect ratio.	18
UNIT II	Line drawing algorithm – Simple DDA – Bresenham's line drawing algorithm – circle generation. Two-dimensional transformations: Basic transformations, Matrix representation-Composite transformation of translation, rotation, scaling – Pivot, point rotation – fixed point scaling, other transformation.	18
UNIT III	Clipping and Windowing: Point clipping –Line clipping – Sutherland – Liang Barsky -Hodgemanpolygonclipping–Textclipping–Viewingtransformation– Windowingtransformation.	18
UNIT IV	Graphical input devices:– Pointing and Positioning –keyboard, mouse, trackball, joystick, scanner, light pens, and tables. Three-dimensional input devices:-printers and plotters. Three-dimensional concepts:-Three dimensional display methods – Three-dimensional transformation – translation, rotation, scaling – Three dimensional viewing – Viewing pipeline –Viewing coordinates – Projections.	18
UNIT V	Hiddensurfaceremoval-Objectspacemethods–Backfacedetectionmethod– Painter's algorithm – Image space methods – Area subdivision – Octree – Depth – buffer– Scan line– Ray tracing, Surface renderings– Surface textures– Shading	18

Text book

Computer Graphics–C Version, Donald Hearn & M. Pauline Baker, Pearson Education,2nd Edition,2013

Reference Book

1. Geometric Tools for Computer Graphics, Philip J. Schneider, David H. Eberly, Morgan Kaufmann Publishers, 2005
2. Principles of Interactive Computer Graphics, William M.Newman, Robert F.Sproull, Tata McGrawHill,2ndEdition,2002

E-Resources:

http://www.svecw.edu.in/Docs%5CCSECGLNotes2013.pdf

https://drive.google.com/file/d/1st2YSA6l3KoCGiNxFmSAXHMbCdxEHN9i/view

Course Outcomes:

On completion of the Course, the learner will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- Use of geometric transformations on graphics objects and their application in composite form.
- Extract scene with different clipping methods and its transformation to graphics display device.
- Students can apply the knowledge, techniques, skills and modern tools to become successful professionals in communication and media industries

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Core Course VII (CC VII)	Python Programming	Course Code:
Instruction : 6	Credits: 5	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Knowledge Level

K1-Acquire/Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- After learning this course, the learner would have acquired the fundamental knowledge on Python programming
- Understood the language and hence the learner becomes skillful in python programming
- Known the usage of modules and packages in python
- Familiarity with the file concept in python been skillful experimenting the concepts of OOPs with python language
- Capable of solving problems using Python

UNIT	CONTENT	HOURS
UNITI	Python – origins –features–variable and assignment –Python basics – statement and syntax-Identifiers–Basic style guidelines –Python objects – Standard types and other built-in types-Internal types –Standard type operators–Standard type built-in functions	18
UNITII	Numbers–Introduction to Numbers–Integers –Double precision floating point numbers - Complex numbers – Operators – Numeric type functions – Sequences: Strings, Lists and Tuples –Sequences–Strings and strings operators–String built-in methods –Lists–List type Built in Methods –Tuples.	18
UNITIII	Mapping type: Dictionaries– Mapping type operators – Mapping type Built-in and Factory Functions- Mapping type built in methods– Conditionals and loops – if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter( ) function -Files and Input/Output–File objects–File built-in functions–File built-in methods–File built-in attributes– Standard files– command line arguments..	18
UNITIV	Functions and Functional Programming – Functions – calling functions – creating functions –passing functions – Built-in Functions: apply( ), filter( ), map( ) and reduce( ) - Modules –Modules and Files–Modules built-in functions -classes –class attributes –Instances.	18

UNITV	Introduction to Bio python – Sequence objects - Sequences and Alphabets, MutableSeq objects - simple Bioinformatics application program.	18

Text Book:

1. Allen B.Downey, "Think Python: How to Think Like a Computer Scientist‘‘ ,2nd edition, Updated for Python3, Shroff /O‘Reilly Publishers, 2016
2. Satyanarayana, Radhika Mani, Jaga desh, "Python Programming", Universities Press (India) Pvt.Ltd 2018. Wesley Chun "Core python Programming" Pearson Education, 2006.
3. AlS weigart, "Invent your own computer games with python", 2nd edition, 2008

Reference Books:

1. Bill Lu banovic, "Introducing Python", O "Reilly, First Edition Second Release,2014.
2. Tony Gaddis," Starting out with python",2nd edition, Addison Wesley, Pearson
3. MichaelDawson,"Pythonprogrammingfortheabsolutebeginner",Premierpress,2003.
4. Sebastian Bassi, Python for bioinformatics, 2/e, CRC Press, 2018.

Web Resources:

https://www.tutorialspoint.com/python/python_data_science
http://astronomi.erciyes.edu.tr/wpcontent/uploads/astronom/pdf/OReilly%20Python%20for%20Data%20Analysis.pdf
https://tanthiamhuat.files.wordpress.com/2018/04/pythondatasciencehandbook.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

- Interpret and manipulate the OOPs Concepts
- Install python and write programs to solve simple problems Explain basic data structures in Python
- Store and manipulate data using file system Implement Python packages and libraries
- Illustrate the concepts of decision making and construct statements.
- Illustrate the usage of data base and regular expression

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-V / Core Practical V (CP V)	**Python Programming Lab**	**Course Code:**
Instruction Hours:5	**Credits:3**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Describe the Strings, List, Tuples and Dictionaries in Python.
- Demonstrate the power of Numbers, Math functions in python
- It enriches the knowledge in programming techniques using pattern matching concepts
- It enables to understand object oriented programming concepts.
- Experiment Python scripting language to develop innovative real time Applications.

List of Practicals:

1. Exercises using conditionals and loops.
2. Exercises for implementing functions.
3. Exercises using list and their built-in functions.
4. Exercises by implementing tuples.
5. Exercises using apply ( ), filter ( ), map ( ) and reduce ( ) functions.
6. Exercises by implementing Modules
7. Exercises by implementing classes and instances
8. Exercises by illustrating regular expression
9. Exercises for implementing files concept.
10. Exercises using strings and their built-in functions.
11. Retrieve nucleotide sequences and perform pair wise and multiple sequence alignment using BLAST tool and analyze the output
12. Retrieve nucleotide sequences and perform multiple sequence alignment using CLUSTALW tool and generate phylogenetic tree
13. Retrieve two nucleotide sequences to align and generate PAM & BLOSUM scoring matrix
14. Convert gene sequence into its corresponding amino acid sequence using translate tool

Course Outcomes:

On the successful completion of the course, learners will be able to,

- Define the basic syntax and statements of Python programming, Syntax and idioms.
- Discuss the various decisions making and construct statement of Python programming. Illustrate the essentials of the Python library.
- Apply object oriented programming concept in real time problems.
- Illustrate pattern matching and extraction using regular expression.
- Demonstrate mapping using file concept.

Semester-V/ Discipline Specific Elective – I (DSE I)	**1. Computer Graphics and Animation Lab**	**Course Code:**
Instruction Hours:3	**Credits:3**	**ExamHours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To Impart Practical Training in Computer Graphics and Animation related problems.
- To implement various graphics drawing algorithms, 2D-3D transformations and clipping techniques.
- Describe and evaluate the eight major classical types of animation
- Identify modern day examples for each classical animation type.
- Emphasis on creating movement and expression utilizing traditional or electronically generated image sequences.

Photoshop :

1. (i) Handling different file formats and interchanging them, changing the resolution, color, Gray scales and size of the images
(ii) Using brushes and creating multicolor real life images
2. Cropping, rotating, overlapping, super imposing, pasting photos on a page
3. Creation of a single image from selected portions of many
4. Developing a commercial brochure with background tints
5. Creating an image with multi-layers of images and texts.
6. Applying masks and filtering on images

Flash :

Develop an image(s) and do the following.

1. Basic Drawing and Painting
2. Working with Strokes and Fills
3. Creating Custom Colors, Gradients, and Line Styles Transforming and Grouping Objects
4. Creating and Managing Multiple Layers
5. Converting Text into Shapes
6. Animate using motion, shape, Tweening, and actions

Course Outcomes:

On completion of the Course, learner should be able to

- Communicate ideas, believable action and emotion effectively by employing principles
- Animation and performance in all aspects of drawing.
- Integrate the concepts, principles and theories involved in the physics of animation in all aspects of drawing.
- Design layouts and backgrounds that incorporate principles of composition, perspective and colour, with speed and accuracy.
- Explain basic ray tracing algorithm, shading, shadows, curves and surfaces and also solve the problems of curves.

Semester-V / Discipline Specific Elective-I (DSE I)	**2. Software Development Tools Lab**	**Course Code:**
Instruction Hours:3	**Credits:3**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Introduce and provide experience in using tools for source code version management
- Familiarize students with tools for software bug tracking in order to gain experience in using such tools
- Cover in detail the full life-cycle of software development: commit code, test and Submit bug reports, provide patches and patch the source code
- Introduce and use tools for builds and installers for various platforms and/or architecture
- Introduce and use tools to develop and run unit tests.

List of Practicals:

1. Introduction to source code version management tools.
2. How to create, check-in, check-out, source code from a version management tool and compare different source code versions.
3. Introduction to source code bug tracking tools.
4. How to report bugs, report feature requests, accept bug reports, browse current reports and amend them.
5. How to create patches (using the development environment), attach them to current bug reports (using the bug tracking tool), apply and verify patches, and check in the patched code (using the version management tool).
6. Introduction to build and release systems.
7. How to tag a version (using version management tool), use a build tool to create binaries for various platforms and/or architectures.
8. How to wrap up the builds and encapsulate them into installers.
9. How to develop unit tests and integrate them into the software development Life cycle.

Course Outcomes:

On completion of the Course, learner should be able to

- Use source code version management tools
- Use bug-tracking tools for application development
- Apply the full cycle of software (source code) development
- Create builds and installers for a software product
- Develop and run unit tests as part of the development cycle.

Semester-V/Ability Enhancement Course II (AEC II)	**Data Visualization Tools Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To understand the importance of data visualization for business intelligence and decision making.
- To Know approaches to understand visual perception
- To Learn about categories of visualization and application areas
- To Familiarize with the data visualization tools
- To Gain knowledge of effective data visuals to solve workplace problems

List of Practicals:

1. Create a bar chart for the given data
2. Create a piech art for the given data
3. Create a scatter chart for the given data
4. Create a time series chart for the given data
5. Create a bullet chart for the given data
6. Create a area chart for the given data
7. Create a heat map for the given data
8. Create a geo map for the given data
9. Create a filled map for the given data
10. Create a dash board and format it.

Course Outcomes:

On completion of the Lab, learner should be able to

- Design and create data visualizations.
- Conduct exploratory data analysis using visualization.
- Craft visual presentations of data for effective communication.
- Use knowledge of perception.
- Cognition to evaluate visualization design alternatives.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlating

M - Moderately Correlating

W-Weakly Correlating

N – No Correlation

Semester-V/ SSD	**Soft Skill Development**	**Course Code:**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks :25	**External Marks:75**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

To encourage the all round development of students by

- Focusing on soft skills of team work.
- Inter-personal relationships.
- Conflict management
- Leadership quality.
- Responsibility.

UNIT	CONTENT	HOURS
UNIT I	KNOW THYSELF/UNDERSTANDING SELF Introduction to soft skills-Self-discovery-Developing positive attitude – Improving perceptions – Forming values.	6 Hours
UNIT II	INTERPERSONAL SKILLS / UNDERSTANDING OTHERS Developing interpersonal relationships-Team building–Group dynamics-Networking-Improved work relationship.	6 Hours
UNIT III	COMMUNICATION SKILLS / COMMUNICATION WITH OTHERS Art of listening-Art of Reading- Art of Speaking-Art of Writing-Art of Writing E-Mail-E-Mail Etiquette.	6 Hours
UNIT IV	CORPORATE SKILLS / WORKING WITH OTHERS Developing Body Language-Practising Etiquette and Memorism –Time Management-Stress Management.	6 Hours
UNIT V	SELLING SELF/JOB HUNTING Writing Resume / CV-Interview Skills-Group Discussion-Mock Interview-Mock GD-Goal Setting- Career Planning.	6 Hours

Text Book:

1.A Book and Development Of Soft Skill Dr. K. Meena&Dr.V. Ayothi. Soft Skills-Dr. K. Alex & Chand Company.

Reference Books:

1. Developing the leader within you John C. Maxwell
2. Good to Great by Jim Collins.

Course Outcomes:

Learner will develop their social and work-life skills, as well as their personal and emotional well- being,

- Resilience
- Communication.
- Emotional maturity.
- Confidence and enthusiasm for learning.
- Citizenship.
- Employability skills.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-V/ Extra Credit V Value Added Course I (Multidisciplinary)	BIO INFORMATICS	Course Code:
Instruction Hours:	Credits:2	Exam Hours:
Internal Marks:-	External Marks:100	Total Marks: Grade

Course Objectives

- To understand the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand how to produce object-oriented software using C++
- Understand fundamentals of object oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- It enables to understand object oriented programming concepts

Theory TOTAL MARKS: 40

Unit-1

History of Bioinformatics – Goal of bioinformatics as a separate discipline – Emerging branches of Bioinformatics-NCBI Pub Med-Genbank, Fasta and Swiss-PORT formats – Sequence Databases : Nucleotide Sequence – Protein Sequence Databases – SWISS-PORT, Protein Structure Visualization Tools: RasMol, Swiss PDB Viewer-Database searching tools– BLAST and FASTA algorithms – Various versions of basic BLAST and FASTA

Unit-2

Various definitions of bioinformatics, history of bioinformatics, applications of bioinformatics- Types of Databases Biological databases: Primary databases – GenBank, Protein sequence databases – Swissport, Blossum- Structural databases – PDB, Bibliographic databases:-Pubmed, Translate tool using DNA,RNA Prediction Tool.

Unit-3

Sequence databases – Nucleic acid sequence databases: GenBank, EMBL, DDBJ; Protein sequence databases: Uniport-KB: SWISS-Port. Structure Databases: PDB, NDB, PubChem, ChemBank. Scoring matrices: basic concept of a scoring matrix, Matrices for nucleic acid and proteins sequences, PAM and BLOSUM series, matrix derivation methods and principles. Pair wise sequence alignment: Basic concepts of sequence alignment

Practical **Total Marks: 60**

1. Explore the sitemap of NCBI and PUBMED and find the official gene symbol, alias name, chromosome number and ID for a particular sequence.
2. Retrieve the Genbank entry with an accession number AF375082 and save the sequence in FASTA format.
3. Retrieve Protein sequences from Protein Data Bank (PDB) and analyze the primary, secondary and tertiary protein structure using tools.
4. Retrieve nucleotide sequences and perform pair wise and multiple sequence alignment using BLAST tool and analyze the output.
5. Convert gene sequence into its corresponding amino acid sequence using Translate Tool.
6. Convert RNA gene sequence into its corresponding amino acid sequence using RNA prediction Tool.
7. Retrieve the structures of the compounds from PubChem: Xylitol, Saccharine, Aspartame
8. Perform the PHI-BLAST and PSI-BLAST for the protein sequence Q1A232. Write the top 4 Escores values and the Sequence ID until convergence.
9. Perform Pair wise alignments for the proteins Insulin from the organism's homosapiens and Musmusculus. Calculate the Percent Similarity and Identity using BLOSUM 62 and PAM 250
10. Find the super secondary structure for any protein database.

Course Outcomes

- After the completion of this course, the students will be able to develop applications.
- Introduces Object Oriented Programming concepts using the C++ language
- Discuss the various decisions making and construct statement of programming. Illustrate the essentials of the library.
- Apply object oriented programming concept in real time problems.
- Illustrate pattern matching and extraction using regular expression.

Semester-VI/ Core Course VIII (CC VIII)	Mobile Computing	Course Code:
Instruction Hours:5	Credits:5	Exam Hours:3
Internal Marks :25	ExternalMarks:75	Total Marks: 100

Knowledge Level

K1-Acquire / Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives:

- To understand the basic concepts and methods of mobile communication systems.
- To impart fundamental concepts in the area of mobile computing, to provide a computer systems perspective on the converging areas of wireless networking, embedded systems, software
- To introduce selected topics of current research interest in the field.
- It will provide a complete overview of the mobile computing subject area, including the latest research.
- In both broad and in-depth knowledge, and a critical understanding of mobile computing from different viewpoints: infrastructures, principles and theories, technologies, and applications in different domains.

UNIT	CONTENT	HOURS
UNIT I	MOBILE COMMUNICATIONS OVERVIEW: Mobile Communication- Mobile Computing – Mobile Computing Architecture - Mobile System Networks - Data Dissemination - Mobility management - Security. Mobile Systems: Mobile Phones - Smart Systems - Limitations of Mobile Devices	15
UNIT II	GSM AND SIMILAR ARCHITECTURES : GSM - Services and System Architecture - Radio Interfaces - Protocols - Localization - Calling – Handover - Security - GPRS. 44 45 Wireless Medium Access Control And Cdma- Based Communication: Medium Access Control - Introduction to CDMA Based Systems	15
UNIT III	MOBILE IP NETWORK LAYER : IP and Mobile IP Network Layers – Packet Delivery and Handover Management - Location Management – Registration - Tunnelling and Encapsulation - Route Optimization. Mobile Transport Layer: Conventional TCP/IP Transport Layer Protocols - Indirect TC P - Snooping TCP - Mobile TCP.	15
UNIT IV	MOBILE DEVICES Device Management - Mobile File Systems - Security. Mobile Ad-Hoc And Sensor Networks: Introduction to Mobile Ad-Hoc Network - MANET - Wireless Sensor Network - Applications.	15
UNIT V	MOBILE APPLICATIONLANGUAGES XML - JAVA -J2ME - JAVA Card. Mobile Operating Systems: Operating System - Windows CE - Symbian OS - Linux for Mobile Devices - Android.	15

Text Book :

Raj Kamal, “Mobile Computing”, Oxford University Press, New Delhi, 2010.

Reference Books :

Jochen Schiller, “Mobile Communication”, Pearson Education, New Delhi, 2008.

Web Resources:

https://cseexamhacks.files.wordpress.com/2017/01/mobile-computing.pdf
https://www.vidyarthiplus.com/vp/attachment.php?aid=43026

Course Outcomes:
On completion of the Course, the learner will be able to

- To explore Mobile security issues.
- To integrate multimedia, camera and Location based services in Android Application
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To learn activity creation and Android UI designing.
- To understand IP and TCP layers of Mobile Communication.

Mapping of Cos with Pos& PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-VI / Core Course (CC) IX	**Computer Networks**	**Course Code:**
Instruction Hours:5	**Credits:5**	**Exam Hours:3**
Internal Marks :25	**External Marks:75**	**Total Marks: 100**

Knowledge Level

K1-Acquire/Remember
K2-Understanding
K3-Apply
K4-Analyze
K5-Evaluate
K6-Create

Course Objectives

- Describe how computer networks are organized with the concept of layered approach.
- Describe how signals are used to transfer data between nodes.
- Implement a simple LAN with hubs, bridges and switches.
- Describe how packets in the Internet are delivered.
- Analyze the contents in a given Data Link layer packet, based on the layer concept.

UNIT	CONTENT	HOURS
UNITI	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	15
UNITII	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	15
UNITIII	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth	15
UNITIV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	15
UNITV	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.	15

Text Book:

1. A. S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.

Reference Book:

1. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition, 2017.
2. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008.
3. D. Bertsekas and R. Gallagher, “Data Networks”, 2nd Edition, PHI, 2008.
4. Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002

Web-Resources:

https://mrcet.com/downloads/digital_notes/CSE/III%20Year/COMPUTER%20NETWORKS%20NOTES.pdf
https://mrcet.com/pdf/Lab%20Manuals/IT/COMPUTER%20NETWORKS%20(R18A0518).pdf
https://kanchiuniv.ac.in/coursematerials/VINODKUMAR_COMPUTER_NETWORKS.pdf
https://www.vssut.ac.in/lecture_notes/lecture1428550521.pdf

Course Outcomes:
On completion of the Course, Students should be able to do
CO 1: Learn the basic concepts of Data Communication and different layers
CO 2: Describe the working strategies of Wireless LAN and Wireless MAN
CO 3: Differentiate the various protocols used in communication
CO 4: Differentiate the IPv4 and IPv6 Addresses
CO5: Familiarizes the basics of GSM and CDMA

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-VI/ Core Course- X (CC X)	DotNet Programming	Course Code:
Instruction Hours:5	Credits:5	ExamHours:3
Internal Marks :25	External Marks:75	Total Marks: 100

Knowledge Level

K1-Acquire/Remember
K2-Understanding
K3-Apply
K4-Analyze
K5Evaluate
K6-Create

Course Objectives:

- This course is designed to provide the knowledge of DotNet Frameworks along with ASP.Net and C#
- Setup a programming environment for ASP.Net programs.
- Configure an asp.net application.
- Creating ASP.Net applications using standard .net controls.
- Connecting to data sources and managing them.

UNIT	CONTENT	HOURS
UNITI	Introduction: Integrated Development Environment - IDE Components - Setting Environment Options - Building a Console application -Variable-Variable as Objects - Constants-Arrays.	15
UNITII	Programming Fundamentals: Flow Control Statement-Writing & using procedures - Argument-Built-in Functions -The Textbox control -The List box, Checked List Box and Combo Box Controls-The Scrollbar or Track bar controls.	15
UNITIII	Working with Forms: Appearance of Forms - Loading or showing Forms - Dynamic Forms -Designing Menus - Common Dialog controls - Rich Text box Control –List view, Tree view, or Image List Controls - Handling Strings or Characters - Handling Dates or Times - Manipulating Folders or Files -Accessing Files.	15
UNITIV	ADO .Net: The Basic Data - Access Classes-storing Data in datasets - Update Operations -Working with Typed Datasets - Data Binding - Designing Data Driven Interfaces.	15
UNITV	Building Web Applications: Understanding HTML or DHTML- working with HTML - Cascading Style Sheets - Server Side Technologies – Controls - ASP.Net Objects - Understanding Web Services.	15

Text Book:

1. Evangelos Petroutsos, *Mastering Microsoft Visual Basic 2008*, Wiley India Edition, Wiley Reprint, 2009.
2. Mathew MacDonald, “ASP.NET: The Complete Reference”, Tata McGraw Hill Ltd., New Delhi, 2017.

Reference Book:

Dr.C.Muthu,“ASP.NET”,ShalomInfoTechPvt.Ltd.,2011.

Web-Resources:

http://sigc.edu/department/computerscience/studymet/AdvancedASP.NET.pdfhttp://www.mentorum.nl/docs/Traindocs/dotNET_Tutorial_for_Beginners.pdf

Course Outcomes:
On completion of the Course, Students should be able to do

CO 1: Understand the fundamental concepts of .NET framework
CO 2: Discuss the use of various web controls and rich controls
CO 3: Interstate Management techniques in asp.net web pages
CO 4: Discuss and extend data list and data grid controls
CO 5: Demonstrate the database connectivity in ASP.NET

Mapping of Cos with Pos& PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	M	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-VI Core Course XI (CC XI)	**Project**	**Course Code:**
Instruction Hours:3	**Credits:3**	**ExamHours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire/ Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To provide basic knowledge of the real time projects of the IT industry. To develop mini real time software's using any platforms such as C, C++, Java, VB, Dotnet, C#, ASP.net, VB.net, Android, iOS, Linux, Python, etc.
- To Identify Project scope, Objectives and Infrastructure.
- To Develop Activity diagram and Class diagram
- To Develop Sequence diagrams and Collaboration Diagram
- To add interface to class diagram

Course Outcomes:

On completion of the Course, learners should be able to

- Able to elicit, analyze and specify software requirements.
- Plan a software engineering process lifecycle.
- Realize design practically, using an appropriate software engineering methodology
- Analyze and translate a specification into a design.
- Able to use modern engineering tools for specification, design, implementation, and testing

Semester- VI / Discipline Specific Elective II (DSE II)	**1. Dot Net Programming Lab**	**Course Code:**
Instruction Hours:3	**Credits:3**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Course Objectives:

- To enable the students to learn the fundamental concepts of ASP.NET.
- Maintain session and controls related information for user used in multi-user web applications
- Understand the fundamentals of developing modular application by using object oriented methodologies
- Use AJAX to create partial-page updates that refresh only the parts of the Web page that have changed.
- Connecting to data sources and managing them.

Knowledge Level

K1-Acquire/Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

List of Practical's:

1. Form Design using Various Web Controls
2. Ad Rotator
3. Calendar Control
4. Login Control
5. Validation Controls
6. Cookie Manipulation
7. State Management (using Session and Application)
8. Data Retrieval, Updating using ADO.NET (using Stored Procedure)
9. Template Creation using Data List
10. Sorting and Paging using Data Grid

Course Outcomes:
On completion of the Course, Students should be able to do
CO 1: Design forms using various web controls
CO 2: Apply rich controls and validation controls to the web page
CO 3: Illustrate cookies, session and application state in a web page Create and manipulate the data in the database using ADO.NET.
CO 4: Create a template using data list and data grid
CO 5: Build an application using XML

Semester- VI / Discipline Specific Elective II (DSE II)	**2. Latex Lab**	**Course Code:**
Instruction Hours:3	**Credits:3**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-**Acquire/ Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objectives:

- To introduce students with software that is being widely used for typesetting especially in Mathematics field.
- To make students know importance of this software for publishing research articles, papers
- Project reports and books and thereby help them to be comfortable with the software.
- To include figures and tables in a Latex document.
- To make conference proceedings and presentations.

List of Practicals:

1. Building a Latex document
2. Previewing first.tex
3. Addition of some text in the.tex file
4. Finding the error and fixing it
5. A centered graph with a caption
6. Two figures next to each other
7. Formation of table
8. Cross references
9. Citation
10. Bibliography
11. Typesetting with a new chapter heading
12. List of figures
13. List of tables
14. Generating index
15. Printing your document

Course Outcomes:

On completion of the Course, the students will be able to

CO1 : Student knows history of Latex and how to install Latex software.
CO2 : Student learns to write equations, matrix and tables
CO3: Student learn to quote the references, equation references, citations.
CO4: Student lists the figures, tables and generating index.
CO5: Typeset a mathematical document using LaTex.

Semester- VI / Discipline Specific Elective III (DSE III)	**1. Android Lab**	**Course Code:**
Instruction Hours:4	**Credits:3**	**ExamHours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-**Acquire/ Remember**	K2-**Understanding**	K3-**Apply**	K4-**Analyze**	K5-**Evaluate**	K6-**Create**

Course Objectives:

- Describe Android platform, Architecture and features.
- Understanding of the real-time embedded and mobile systems, and the techniques essential to the design and implementation of mobile applications.
- Understand the various parts of an Android Project.
- Use the Android Emulator.
- Install and run the application on a physical device.

List of Practicals:

1. Different Layout design including nested layout for a single Bio data.
2. Arithmetic Operation for two numbers
3. Business Calculator
4. Animation: Bouncing of a ball
5. Intent
6. Database SQLite: Student Biodata
7. Fragments - Tablet Programming
8. Media Player

Course Outcomes:

On completion of the Course, the learner will be able to

- Experiment on Integrated Development Environment for Android Application Development.
- Use Intent, Broadcast receivers and Internet services in Android App.
- Design and implement Database Application and Content providers.
- Use multimedia, camera and Location based services in Android App.
- Discuss various security issues in Android platform

Semester-VI / Discipline Specific Elective- III (DSE III)	**2. UI/UX Design and Animation Lab Using Open Source Tools**	**Course Code:**
Instruction Hours:4	**Credits:3**	**Exam Hours:3**
Internal Marks :40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire / Remember	K2-Understanding	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- Demonstrate the techniques of photo editing.
- Apply layer masks, filters and blending modes, share and save your images in various formats.
- Demonstrate the techniques for resize and crop images.
- Learn various retouching and repairing techniques to correct images.
- Learn the creation of various shapes and working with various files.
- Identify a websites target audience and create user personals to create an audience appropriate design for a website.

List of Practicals:

Photoshop:

1. Create scenery using Photo shop brushes.
2. Demonstrate the use of layer effects.
3. Demonstrate the use of ripple effect and lens flare.
4. Coloring a BW photo.
5. Create photo frame effect.
6. Create a 3D Photo effect.
7. Create 2D and 3D logos.
8. Create a Christmas Tree with Blinking Lights.
9. Animate a candle flame using Liquify filter

Adobe Illustrator

1. Working with files.
2. Working in layers.
3. Viewing artwork.
4. Creating Basic Shapes.
5. Placing Images.
6. Drawing graphs.
7. Working with imported artwork.

Course Outcomes:

On completion of this lab course the learner will be able to,

- Understand the Usability of Interactive systems.
- Understand Guidelines
- Understand Principles
- Be able to manage the development process
- Interaction styles

Semester-VI/ Skill Enhancement Course (SEC – IV)	**GIMP Lab**	**Course Code:**
Instruction Hours:2	**Credits:2**	**Exam Hours:3**
Internal Marks:40	**External Marks:60**	**Total Marks: 100**

Knowledge Level

K1-Acquire/Remember	K2- Understanding	K3- Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Objectives:

- To understand about data compression techniques, image compression techniques like JPEG, video compression techniques like MPEG, and the basic concepts about animation.
- To offer the knowledge of creating and working with digital images
- To manipulate them and to develop a presentation package using multimedia tools.
- To give an overall view of multimedia tools.
- To understand and differentiate text, image, video & amp; audio.

List of Practical's:

GIMP(Photoshop Equivalent)

1. Cropping images using Lasso Tools
2. Designing Pictures using Paint Tools
3. Designing Text using Text Tools
4. Applying Layer Effects to Images and Texts

Synfig (wiki.synfig.org/Category: Tutorials)(Flash equivalent)

1. Create an animation for bouncing a ball
2. Create brushed out lines for an image
3. Build a magnifying glass
4. Develop a slideshow of photos with transitions

Aptana (http://content.aptana.com/aptana/tutorials/**)(Dream weaver equivalent)**

1. Developing a simple web page with images and links
2. Develop a webpage displaying the time table of the Department
3. Design an application form for Student Admission
4. Create your own web blog for college events

Course Outcomes:

On completion of the Course, learners should be able to

- To learn and understand technical aspect of Multimedia System
- Design and implement an animation for various themes.
- Prepare multimedia advertisement.
- Develop various Multimedia Systems applicable in real time.
- To develop multimedia application and analyze the performance of the same

Semester-VI/ Ability Enhancement Course- III (AEC III)	**IoT Lab**	**Course Code:**
Instruction Hours: 2	**Credits: 2**	**Exam Hours:3**
Internal Marks:40	**External Marks:60**	**Total Marks:100**

Knowledge Level
K1 -Recalling
K2 -Understanding
K3 -Applying
K4 - Analyzing
K5 - Evaluating
K6 - Creating

Course Objectives:

- Focus on research design and development of IoT enabled technologies which are cost effective and socially relevant.
- The interconnection and integration of the physical world and the cyber space.
- They are also able to design & develop IoT Devices
- This laboratory provides extensive hands-on to design various embedded system and exposes with the tools required to turn them into IoTs.
- Various fields of engineering such as embedded system, wireless sensor networks, control system, automation systems are together interconnected to form the Internet of Things (IoT).

List of Practical's:

1. Exercises on domain specific applications of IoT
2. Exercises on Gas Sensor based application using Simulators.
3. Exercises on PIR Sensor based application using Simulators.
4. Exercises on Touch Sensor based application using Simulators
5. Exercises Using Microcontroller based Embedded Platforms in IoT

Course Outcomes:
On completion of the Course, Students should be able to do

- Understand the basic concepts of IoT
- Design embedded platforms in IoT using Microprocessor.
- Apply wireless peripherals for exchange of data.
- Apply Cloud Platform to Upload and Analyze the Sensor Data.
- Deploy simple application of IoT for Real time

Semester-VI / GS	GENDER STUDIES	Course Code:
InstructionHours:1	Credits:1	ExamHours:3
Internal Marks :25	External Marks:75	Total Marks: 100

Course Objectives:

- To make students to aware of Gender constructions and gendering Process
- To explore existing gender biases in the society and to understand the need to work towards the inclusive society
- To inculcate sensitivity and build gender perspectives.
- To use the course to bring attitudinal cum behavioral changes towards gender neutral ambience and promote the humanistic values

Units	Contents	Hours
I	**INTRODUCTION TO GENDER STUDIES CONCEPTS** Gender Spectrum.-Sex–Gender distinction–Biological Determinism–Patriarchy–Feminism –Gender Socialization and Stereotyping-Gender Discrimination–Gender Division of labour and roles– Gender Sensitivity and awareness – Gender Equity – Equality – Gender Main streaming and Gender Analysis.	3
II	**UGCINITIATIVESONWOMEN'SSTUDIES** Definition of Women's Studies –Gender Studies –UGC Initiatives and guidelines on Women's Studies-Beijing Conference, UN Initiatives – Convention on Elimination of All forms of Discrimination Against Women (CEDAW)- Sustainable Development Goals on Gender Equality (SDG 5) and targets	3
III	**AREAS OF GENDER DISCRIMINATION** Gender Socialization- Sex Ratio– Health and Nutrition– – Literacy and Education - Employment- Governance – participation in decision making- politics- property rights and access to credit- gender based violence- Social institutions –Family, Caste, Class, religion, gender, State. Market – Media – Politics – Judiciary	3
IV	**WOMEN DEVELOPMENT AND GENDER EMPOWERMENT** Towards Equality Report of Status of Women in India 1974 – International Women's Decade – International Women's Year – National Policy for Empowerment of Women 2001	3

V	**WOMEN'S MOVEMENTS AND SAFEGUARDING MECHANISM :** In India National /State Commission for Women(NCW) – All Women Police Station – Family Court Legislations safeguarding women – Transgender Policy—Constitutional amendments for women's political participation	3
VI	**CURRENT CONTOURS: (for continuous internal assessment only):** Pothu Tamil Nadu State Policy for Women 2021- National Policy for Women 2015 – Prevention of Sexual Harassment at Work places Act 2013- Protection of Children from Sexual Offences Act, 2012 - Analysis of regressive and progressive High court and Supreme Court judgments- women proactive policies, programmes, interventions	3

REFERENCE:

1. BhasinKamala,UnderstandingGender:GenderBasics,NewDelhi:WomenUnlimited, 2004
2. BhasinKamala,ExploringMasculinity:GenderBasics,NewDelhi:WomenUnlimited,2004
3. BhasinKamala,WhatisPatriarchy?: Gender Basics,NewDelhi:WomenUnlimited,1993
4. AryaSadhnaWomen,GenderEqualityandtheState,NewDelhi:Deep&DeepPublication, 2000
5. Mishra.O.P,LawRelatingtoWomen&Child,Allahabad:Central LawAgency2001
6. UmaChakravarti,GenderingCasteThroughaFeministLens,SagePublication2003
7. BhattacharyaMalini,SexualViolenceandLaw,Kolkata;WestBengalaCommissionfor Women,2002
8. SexualHarassmentatthe Workplace–AGuide,NewDelhi;Sakshi,1999
9. https://www.schooloflegaleducation.com/women-and-law-in-india-e-book/

Semester-VI/ Extra Credit Courses VI **Value added Course II (Same disciplinary)**	**Data Science**	**Course Code:**
Instruction Hours:	**Credits: 2**	**Exam Hours: 3**
Internal Marks :-	**External Marks: 100**	**Total Marks: Grade**

Knowledge Level

K1-Acquire/Remember
K2-Understanding
K3-Apply
K4-Analyze
K5Evaluate
K6-Create

Course Objectives:

- Understand the basic principles and concepts of data science and its relevance to management.
- Collect, pre-process, and explore datasets to extract meaningful insights.
- Apply statistical techniques and models to analyse data and draw conclusions.
- Develop predictive models to forecast future trends and outcomes.
- Utilize data-driven approaches to support strategic decision-making in business.

UNIT	CONTENT	HOURS
UNIT I	Data Evolution: Data Development Time Line - ICT Advancement - a Perspective –Data Growth - a Perspective - IT Components - Business Process – Landscape - Data to Data Science - Understanding data: Introduction - Types of Data: Numeric - Categorical – Graphical - High Dimensional Data - Data Classification - Sources of Data: Time Series - Transactional Data - Biological Data - Spatial Data - Social Network Data- Data Evolution - Data Sources- Statistical Inferences from Data.	-
UNIT II	Data Science: Data Science - A Discipline –Data Science vs Statistics, Data Science vs Mathematics, Data Science vs Programming Language, Data Science vs Database, Data Science vs Machine MDA2202 FOUNDATIONS OF DATA SCIENCE Category L T P Credit Theory 56 4 - 4 Learning. Data Analytics- Relation: Data Science, Analytics and Big Data Analytics. Data Science Components – Big data technology – Data Science user- roles and skills- Data Science use cases	-
UNIT III	Digital Data-an Imprint: Evolution of Big Data –What is Big Data –Sources of Big Data. Characteristics of Big Data 6Vs –Big Data Myths –Data Discovery-Traditional Approach, Big data Technology: Big Data Technology Process –Big Data Exploration -Data Augmentation – Operational Analysis –360 View of Customers –Security and Intelligence	-
UNIT IV	R Basics: Introduction- Packages and Library – Data types – Basic operators – R objects- Vectors – Lists- Arrays – Matrix- Factors – Data frame- R file formats- Importing and exporting files – Data Visualization in R: Lattice package- Box plot- bar chart – scatter plot- GGplot2	-

UNITV	Statistical Measures in R: Measures of central tendency – Range- inter quartile range – Mean – Median – variance- Standard deviation – Sampling distribution – probability distributions- hypothesis tests – Time Series Analysis: Multivariate Time Series	-

Text Book:

1. V. Bhuvaneswari, T. Devi, (2016). Big Data Analytics: A Practitioner's Approach, Bharathiar University Mathew MacDonald, " ASP.NET: The Complete Reference", Tata McGraw Hill Ltd., New Delhi, 2017.
2. V. Bhuvaneswari (2016). Data Analytics with R, Bharathiar University

Reference Book:

1. Nina Zumal, John Mount (2014). Practical Data science in R, Managing Publication Company
2. Bernard Kolman, Robert C. Busby and Sharon Ross (2004). Discrete Mathematical Structures, New Delhi: Prentice Hall

Web-Resources:

https://www.psgrkcw.ac.in/wp-content/uploads/2024/01/M.Sc-DA-Syllabus-2022-2024

Course Outcomes:

On Completion of the course the student should be able to

- Understand data classification, process of big data technology, user roles and skills in data science and its tools.
- Apply the fundamental concepts, tools and techniques of data science in 360 view of Customer
- Analyze the methodologies of data science and its tools.
- Evaluate myths in big data, functionalities of R
- Create solutions for the problems related to data science using R.

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	M	M	M	S	S	S	S	S	S
CO2	S	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation