

**ETHIRAJ COLLEGE FOR WOMEN [AUTONOMOUS]
CHENNAI – 600 008**

**BACHELOR OF COMPUTER APPLICATIONS
(Self-Supporting)**

SYLLABUS



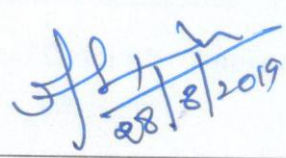
**CHOICE BASED CREDIT SYSTEM
OUTCOME BASE EDUCATION**

OFFERED FROM THE ACDEMIC YEAR 2018-2019

DEPARTMENT OF COMPUTER APPLICATIONS [B.C.A]

MEMBERS OF BOARD OF STUDIES FOR THE YEAR 2018-2019

The Board of Studies meeting was held on 28-08-2019 at 3.30 p.m. in the Department of Computer Applications [B.C.A]. The members of the Board were:

S.NO	NAME & ADDRESS	SIGNATURE
1	Mrs. M.Henila [Chairperson] Head of the Department, Department of Computer Applications Ethiraj College for Women, Chennai.	 28/8/2019
2	Dr. P.L.Chithra [University Nominee] Professor, Dept of Computer science, University of Madras, Guindy Campus, Chennai.	PL. Chithra 28/08/2019
3	Dr.M.Sornam [Subject Expert] Professor, Dept of Computer science, University of Madras, Guindy Campus, Chennai.	Mr. Sornam 28/8/19.
4	Dr. Sumathy Kingslin [Subject Expert] Associate Professor, Dept of Computer Science, Quaid-E-Millath Govt. college for women, Anna salai, Chennai.	Sumathy 28/8/19
5	Mr. S.Vinoth [Industrial Expert] Senior Manager,UI SCIO Health and Analytics, MRC Nagar, Chennai	S. Vinoth 28/8/19
6	Mrs S.Janes Pushparani Assistant Professor, Dept of Computer Applications [B.C.A], Ethiraj College for Women, Chennai	S. Janes 28/08/19
7	Mrs. A.Radhika Assistant Professor, Dept of Computer Applications [B.C.A], Ethiraj College for Women, Chennai	A. Radhika 28/8/19
8	<u>STUDENT REPRESENTATIVES:</u> ➤ Ms.K.Sathya Priya ➤ Ms.S.Sapna	K. Sathya Priya 28/8/19 S. Sapna 28/8/2019

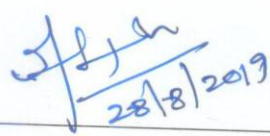
ETHIRAJ COLLEGE FOR WOMEN
DEPARTMENT OF COMPUTER APPLICATIONS [B.C.A]
[AUTONOMOUS]

MINUTES OF THE BOARD OF STUDIES HELD ON 28-08-2019 AT 03.30 P.M

The Board of Studies meeting was conducted in the Department of Computer Applications [B.C.A] on 28-08-2019 at 03.30 P.M.

The following changes were recommended by the Board Members:

- The new elective papers introduced for Semester V and Semester VI are recommended for implementation.
- Mini project has to be included based on elective subjects.
- MOOC course has to be incorporated as a unit in all the subjects.
- OER (Open Educational Resources), NDL (National Digital Library of India) material to be utilized.
- Limit the recommended text books for subjects not more than two.
- In Semester V, JQuery can be included in Web technology laboratory.
- In Semester V, Human Computer Interaction (HCI) can be included to help students to build web page.
- In Semester VI, React.js can be included.
- In Software Engineering, Case studies can be incorporated to fine-tune the industrial problem solving experience.
- In Artificial Intelligence, instead of Expert System, machine learning introduction may be incorporated.
- While evaluating the Continuous Assessment for Mini Project, internship and viva voce component has to be brought at the end.
- Latest edition books in all courses must be ensured.

S.NO	NAME & ADDRESS	SIGNATURE
1	Mrs. M.Henila [Chairperson] Staff – in – Charge, Department of Computer Applications [B.C.A] Ethiraj College for Women.	 28/8/2019
2	Dr. P.L.Chithra [University Nominee] Professor, Dept of Computer science, University of Madras, Guindy Campus, Chennai.	PL Chithra 28/08/2019
3	Dr.M.Sornam [Subject Expert] Professor, Dept of Computer science, University of Madras, Guindy Campus, Chennai.	M. Sornam 28/8/19
4	Dr. Sumathy Kingslin [Subject Expert] Associate Professor, Dept of Computer Science, Quaid-E-Millath Govt. college for women, Anna salai, Chennai.	Sumathy 28/8/19
5	Mr. S.Vinoth [Industrial Expert] Senior Manager,UI SCIO Health and Analytics, MRC Nagar, Chennai	S. Vinoth 28/8/19
6	Mrs S.Janes Pushparani Assistant Professor, Dept of Computer Applications [B.C.A], Ethiraj College for Women, Chennai	S. Janes 28/08/19
7	Mrs. A.Radhika Assistant Professor, Dept of Computer Applications [B.C.A], Ethiraj College for Women, Chennai	A. Radhika 28/8/19
8	<u>STUDENT REPRESENTATIVES:</u> ➤ Ms.K.Sathya Priya ➤ Ms.S.Sapna	K. Sathya Priya 28/8/19 S. Sapna 28/8/2019

- The meeting concluded at 5.30 pm
- The meeting resolved to approve and ratify the syllabi followed by B.C.A. students admitted in the year 2018-2021.

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2	Programme Educational Objectives
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RULES AND REGULATIONS FOR THE PROGRAMME

ELIGIBILITY CRITERIA FOR ADMISSION

Candidates for admission into the first year of the Degree of Bachelor of Computer Applications course, shall be required to have passed the Higher Secondary Examinations(Academic or Vocational stream) conducted by the Govt. of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the University of Madras. The Candidate should have Mathematics / Business Mathematics / Computer Science / Statistics as one of the subjects in Higher Secondary Examinations.

ELIGIBILITY FOR THE AWARD OF THE DEGREE

A candidate shall be eligible for the award of the Degree only if she has undergone the prescribed course of study in the College for a period of not less than three academic years, passed the Examination of all the six semesters prescribed.

COURSE OF STUDY

The main subject for the Bachelor Degree shall consist of the following:

PART I	: Foundation Course - Languages
PART II	: Foundation Course – English
PART III	: Major and Allied Subjects
PART IV	: Non-Major Electives / Soft skills

DURATION

Each academic year is divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semesters respectively. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall not be less than 450 hours / 90 days for each semester and each day will have five working hours.

MEDIUM OF INSTRUCTION

The Medium of Instruction and Examination (Written and Viva Voce) shall be English.

PASSING MINIMUM

A candidate shall be declared to have passed in each paper/practical of the main subject of study wherever prescribed, if she secured NOT LESS than 40/100 in the Examination. She shall be declared to have passed the whole examination, if she passes in all papers and practical wherever prescribed as per scheme of examination.

CLASSIFICATION OF SUCCESSFUL CANDIDATES

I Class, II Class, III Class

PROGRAMME EDUCATIONAL OBJECTIVES

On obtaining an undergraduate degree the students will be able to:

PEO1: Apply and advance the knowledge and skills acquired, to become a creative professional in their chosen field.

PEO2: Engage in self-directed continuous learning, aimed at global competency, which will promote professional and personal growth.

PEO3: Develop management skills and entrepreneurial skills, by harnessing core competencies tempered by values and ethics.

PEO4: Work towards achieving economic and social equity for women through application of relevant knowledge.

PEO5: Contribute to promoting environmental sustainability and social inclusivity.

PROGRAMME OUTCOMES

On completion of the Programme, the learner will be able to:

1. Promote and apply scientific knowledge for finding sustainable solution to real time problems.
2. Identify, Analyse and formulate novel ideas to yield sustainable results in the field of research utilizing the principle concepts of programming languages combined with theoretical knowledge of Computer applications.
3. Relate key concepts and principles of programming languages to various applications in Software industry.
4. Cultivate unparalleled comprehension of fundamental concepts relevant to basic computing techniques leading to an individual progress and career advancement at the National and Global levels.
5. To communicate effectively their views and ideas orally/written in English and in other related languages.
6. Design solutions for complex problems and design system components or processes that meet the specific needs with appropriate consideration for public health and safety, cultural, societal and environmental conditions.

PROGRAMME SPECIFIC OUTCOMES

- PSO 1 :** Demonstrate the ability to adapt to technological changes and innovations in the discipline
- PSO 2 :** Analyze, design, implement and evaluate computerized solutions to real life problems using appropriate computing methods.
- PSO 3 :** Develop skilled manpower in various areas of software industry.
- PSO 4 :** Develop a small programs for personal use and implementing a software product.
- PSO 5 :** Possess strong foundation for their higher studies.
- PSO 6 :** Blend analytical, logical and managerial skills with the technical aspects to resolve business challenges.

PROGRAMME PROFILE

SEM	PART	COURSE CODE	COURSE TITLE	CR	HRS	MARKS		
						CA	SE	TOT
I								
	Part I		Language	3		40	60	100
	Part II		English	3		40	60	100
	Core	CA18/1C/IPC	Introduction to Computers and Programming in C	5	105	40	60	100
	Allied	MA18/1A/STM	Statistics	5		40	60	100
	Practical	CA18/1C/PR1	C Laboratory	2	45	40	60	100
	Part IV	CA18/1N/COA	Non-Major Elective : Office Automation	2	30	-	50	50
	Part IV		English Language and Communication Skills-I	3		25	25	50
II								
	Part I		Language	3		40	60	100
	Part II		English	3		40	60	100
	Core	CA18/2C/DSC	Data Structures and Programming in C++	5	105	40	60	100
	Allied	MA18/2A/OPR	Operations Research	5		40	60	100
	Practical	CA18/2C/PR2	C++ and Data structures Laboratory	2	45	40	60	100
	Part IV	CA18/2N/WWH	Non-Major Elective : World Wide Web with HTML	2	30	-	50	50
	Part IV		English Language and Communication Skills-II	3		25	25	50
III								
	Core	CA18/3C/CCG	Computer Graphics	3	60	40	60	100
	Core	CA18/3C/CVP	Visual Programming	3	60	40	60	100
	Core	CA18/3C/RAO	RDBMS and ORACLE	3	60	40	60	100
	Allied	CA18/3A/CFA	Financial Accounting	5	90	40	60	100
	Practical	CA18/3C/PR3	VB and ORACLE Laboratory	3	75	40	60	100
	Practical	CA18/3C/PR4	Computer Graphics using C Laboratory	2	45	40	60	100
	Part IV		Environmental Studies	2	30	-	50	50
	Part IV		English Language and Communication Skills-III	3		25	25	50

IV								
	Core	CA18/4C/PJP	Programming in Java	3	60	40	60	100
	Core	CA18/4C/COS	Operating System	3	60	40	60	100
	Core	CA18/4C/CSA	Computer System Architecture	3	60	40	60	100
	Allied	CA18/4A/CMA	Management Accounting	5	90	40	60	100
	Practical	CA18/4C/PR5	Java Laboratory	3	75	40	60	100
	Project	CA18/4C/PO1	Term paper and Seminar	2	45	40	60	100
	Part IV		Value Based Education	2	30	-	50	50
	Part IV		English Language and Communication Skills-IV	3		25	25	50
			SEMESTER – V					
	Core	CA18/5C/DNT	Core : Dot Net Technologies	4	75	40	60	100
	Core	CA18/5C/CSE	Core : Software Engineering	4	75	40	60	100
	Core	CA18/5C/WEB	Core : Web Technologies	4	75	40	60	100
	Elective	CA18/5E/CDM	Elective I : Data Mining	4		40	60	100
	Elective	CA18/5E/AIM	Elective I: AI and Machine Learning	4		40	60	100
	Core	CA18/5C/PR6	Practical VI : Dot Net Laboratory	3		40	60	100
	Core	CA18/5C/PR7	Practical VII : Web Technology Laboratory	3		40	60	100
			SEMESTER – VI					
	Core	CA18/6C/DCN	Core: Data Communications and networking	4		40	60	100
	Core	CA18/6C/CCT	Core: Computing Technologies	4		40	60	100
	Core	CA18/6C/CMM	Core: Multimedia	4		40	60	100
	Elective	CA18/6E/IOT	Elective II : Internet of things	4		40	60	100
	Elective	CA18/6E/CCS	Elective II : Cyber Security	4		40	60	100
	Project	CA18/6C/PO2	Internship and Mini Project	4		40	60	100
	Practical	CA18/6C/PR8	Multimedia Laboratory	3		40	60	100
		Part V	Extension Activity	1		-----	-----	
			TOTAL	140				

SEM	PART	COURSE CODE	COURSE TITLE	CR	MARKS
V	Self-Study	CA18/5SS/CSD	Case Studies using Data Mining	2	100

EVALUATION PATTERN FOR CONTINUOUS ASSESSMENT

PART I, II, III – THEORY PAPERS :-

Continuous Assessment				
Test I (2hrs)	Test II (2hrs)	Quiz	Participatory Learning	Total
10	10	10	10	40

PART III – PRACTICAL PAPERS :

Continuous Assessment				
Test I (2hrs)	Test II (2hrs)	Record work	Participatory Learning	Total
10	10	10	10	40

PART III : INTERNSHIP AND MINI PROJECT :

Internship Documentation	Internship Viva-voce	Project Documentation	Project Review	Total
5	20	5	10	40

CA QUESTION PAPER PATTERN :

PART I, II

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 3 X 2	50	6	50	2 Hrs.	-
K1,K3	B - 3/4 X 8	250	24			
K2,K3	C - 1/2 X 20	500	20			

RUBRICS FOR CONTINUOUS ASSESSMENT EVALUATION

Assignment	Content/originality/Presentation/Schematic Representation and Diagram/Bibliography
Seminar	Organisation/Subject Knowledge/Visual Aids/Confidence level/presentation-Communication and Language
Field Visit	Participation/Preparation/Attitude/Leadership
Quiz	Understanding/Concept/Logical sequence/Analysis/Problem solving
Participation	Answering Questions/Clearing Doubts/Participating in Group Discussions/Regular Attendance
Case Study	Finding the Problem/Analysis/Solution/Justification
Problem Solving	Understanding Concepts/Formulas and Variable Identification/Logical Sequence/Answer
Group Discussion	Preparation/Situation Analysis/Relationship Management/Information Exchange/Delivery Skills
Flipped/Blended Learning	Preparation/Information Exchange/ Group interaction/Clearing doubts

EVALUATION PATTERN FOR END SEMESTER

PART I, II, III – THEORY PAPERS (Semester I,II,III,IV,V,VI):

Time : 3 hours.

Maximum Marks : 100 [to be converted to 60 marks]

Double evaluation by Course teacher and External Examiner. Pass mark is 40.

III - PRACTICAL(Semester I,II,III,IV,V,VI):

Time : 3 Hours

Maximum Marks : 60

Double evaluation by course teacher and External Examiner. Practical Questions selected by an External Examiner from a Question bank prepared by the department will be given to students to write programs and to execute the same.

TERM PAPER AND SEMINAR VIVA-VOCE:

Maximum Marks : 60

Power point presentation along with documentation of Term paper will be submitted and presented for Viva-Voce.

INTERNSHIP AND MINI PROJECT VIVA-VOCE:

Maximum Marks : 60

Software developed along with Documentation will be submitted for Viva-Voce.

PRACTICAL ORIENTED SKILL BASED NME :

Practical test for two hours for 50 marks will be conducted at the end of the semester

END SEMESTER QUESTION PAPER PATTERN :

THEORY PAPERS :

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			

K2,K3	C - 2/4 X 20	500	40			
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COURSE PROFILE SEMESTER I

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/1C/IPC	Introduction to Computers and Programming in C	5	7	105 hrs	4	3	-	40	60	100
CA18/1C/PR1	C Laboratory	2	3	45 hrs Practical	0	0	3	40	60	100

SEMESTER I

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/1C/IPC	Introduction to Computers and Programming in C	5	7	105hrs Theory	4	3	-	40	60	100

Course Objective :

To enable the students

1. To enable the students to draw flowcharts and design algorithms.
2. To understand about various digital circuits.
3. To gain knowledge about basics of programming language C.
4. To understand the concept of arrays and functions.
5. To gain knowledge about structures, pointers and file concepts in C

Course Outline

Unit - I :

Introduction: Programming Languages: Overview - Requisites of a good programming language – Good programming practices – Efficiency of programming – Classification of Languages. Flowcharting Techniques: Introduction to algorithms and flowchart – definition of flowchart – Examples.

(20 hrs)

Unit - II :

Digital Systems and Binary Numbers: Binary Numbers – Number – base Conversions- Octal and Hexadecimal Numbers – Complements –Binary Codes . Boolean Algebra and Logic Gates : Basic Definitions-Axioms – Basic Theorems and Properties of Boolean Algebra- Canonical and Standard Forms. Combinational Circuits: Binary Adder/Subtractor–Decoders- Encoders – Multiplexers –Demultiplexers- Sequential Circuits: Flip Flops –RS, JK, D,T flip flops

(20 hrs)

Unit III :

C fundamentals: Character set – C tokens – keywords and identifiers – constants, variables – data types - declarations – Operators and Expressions: Arithmetic, unary, relational and logical, assignment, bitwise, comma and conditional operators –Data input/output Operations –Control structures – conditional

branching : if, if.. else , switch, while , for, do.. while, break , continue, unconditional branching – go to statement.
(25 hrs)

Unit - IV :

Arrays: defining and processing – passing arrays to functions – multi dimensional arrays – Character arrays and string - Functions – defining, accessing functions – functions prototypes – passing arguments – Categories of functions - recursions – storage classes.
(20 hrs)

Unit - V :

Structures and Unions: Introduction – Array of structures - structures and functions – unions. Pointers – declarations – pointers and arrays – Array of pointers – structures and pointers. Files : creating , processing , opening and closing.
(20 hrs)

Recommended Text Books

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1	Computer Applications in Businesss and Management	Ananathi Sheshasaayee & Sheshaasaayee	Margham Publications 7 th edition	2009.
2	Digital Design	M.Morris Mano and Michael D.Ciletti	Pearson Publications Fourth Edition	2006
3	Programming in ANSI C	E.Balaguruswamy	Tata McGrawhill publications 5 th edition	2010

Reference Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1	Pointers in C	Yashavant Kanetkar	BPB Pub., Fourth edition	2009.
2	Programming with C	Gottfried B.S.	Pearson Publications Fourth Edition	1996
3	Digital Fundamentals	V.Vijayendran	S.Viswanathan printers & publishers Pvt. Ltd. 3 th edition	2006

E-Learning Resources:

S.No.	URL
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1	www.techbooksforfree.com
2	www.publications.gbdirect.co.uk/c_book
3	www.electronics-tutorials.ws

Course Outcomes :

CO No.	CO Statement
1	Identify the basics of programming languages
2	Analyze the fundamentals of digital logics
3	Demonstrate the basics of C language
4	Apply programming concepts related to arrays and functions
5	Use the concepts of structures, unions and files using C

Mapping of Course Outcome with Programme Specific Outcome

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3
Average	3	3	3	3	3	2.2

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology :

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			
K2,K3	C - 2/4 X 20	500	40			

SEMESTER : I

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/1C/PR1	C Laboratory	2	3	45 hrs Practical	0	0	3	40	60	100

Course Objective :

To enable the students

1. To develop their own C programs.
2. To read , understand and trace the execution of a program
3. To solve real world problems using C language
4. To debug logical and syntax errors
5. To implement concepts like arrays, structures, files using C

Course Outline

1. Control statements
2. Functions
3. Arrays and structures
4. Pointers
5. File handling

[Two to three problems under each heading]

Course Outcomes :

CO No.	CO Statement
1	Analyze the execution of control structures using C Programs
2	Implement the concept of functions using C programs
3	Apply arrays and structures concepts in C Programs
4	Write programs using pointers in C language
5	Demonstrate file concepts using C language

Mapping of Course Outcomes with Programme Specific Outcome

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3

CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology :

Practical demonstrations, Discussion, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A - 2 X 30	60	60	3 Hours

COURSE PROFILE SEMESTER II

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/2C/DSC	Data Structures and Programming in C++	5	7	105 hrs Theory	4	3	0	40	60	100
CA18/2C/PR2	C++ and Data Structures Laboratory	2	3	45 hrs Practical	0	0	3	40	60	100

SEMESTER II

Course Code	Course Name	Credits	Hours/ Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/2C/DSC	Data Structures and Programming in C++	5	7	105 hrs Theory	4	3	0	40	60	100

Course Objective :

To enable the students

1. To develop C++ programs.
2. To analyze data structures concepts
3. To solve real world problems using C++ language
4. To implement data structure concepts using C++
5. To implement concepts like arrays, structures, files using C++

Course Outline :

UNIT I:

Definition of a Data structure - Arrays: Linear array, Representation of linear array in memory-Traversing linear array-Insertion and Deletion. Linked Lists: Representation of Linked lists in memory-Traversing a Linked List-Searching a Linked List -Insertion into a Linked List-Deletion from a Linked List-Application: Polynomial Addition. Doubly Linked List: Insertion and Deletion.

(20 hrs).

Unit II:

Stacks: Representation of Stacks Using Array –Push and Pop Operations-Applications: Infix to Postfix Conversion, Recursion. Queues: Representation of Queues-Enqueue and Dequeue Operation. Trees: Introduction-Binary Trees-Representing Binary Trees in Memory-Traversing Binary Tree (Recursive Procedure). Graph: Representations of Graph- Traversing: BFS and DFS.

(20 hrs).

Unit III:

Software Crisis - Software Evaluation - OOP Paradigm - Basic Concepts of OOP - Benefits of OOP - Application of OOP- Introduction to C++ - Tokens - Keywords - Identifiers - Variables - Operators -

Manipulators - Expressions and Control Structures - Functions - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions–Recursion-Function Overloading.
(20 hrs.)

Unit IV:

Classes and objects – Constructors and Destructors – Operator Overloading and Type Conversions – Inheritance – Pointers, Virtual Functions and Polymorphism.
(25 hrs)

Unit V:

Managing Console I/O Operations – Files – File operations – File pointer – Error Handling during file operations – Command line arguments.
(20 hrs)

Recommended Text Books

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1	Schaum's Outlines Data Structures	Seymour Lipschutz	Mc Graw Hill	2014
2	Data Structures, Algorithms and Applications in Java	Sartaj Sahni	University Press	2005
3	Object Oriented Programming with C++	E.Balaguruswamy	Tata McGrawhill publications 5 th edition	2013

Reference Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1	Fundamentals of Data structures in C++	E.Horowitz and S.Shani	Galgotia Pub	1999.
2	Computer Alogrithms,	Horowitz S.Shani, and S.Rajasekaran	Galgotia Pub	2016
3	Data Structures	A Chitra and P T Rajan	Nicoles Pvt Ltd.	2016
4	An introduction to Data Structures with applications	Jean-Paul Tremblay, Paul G. Sorenson	TMH	2000
5	Object Oriented Programming in Microsoft C++	Robert Lafore	Galgotia	1993

E-Learning Resources:

S.No.	URL
1	www.tutorialspoint.com/data_structures_algorithms/index.htm
2	http://www.elearningsites.net/
3	http://elearning.vtu.ac.in/
4	www.cplusplus.com

Course Outcome :

CO No.	CO Statement
1	Design algorithms using data structures concepts
2	Implement data structure concepts like stacks, queues, trees and graphs
3	Identify the basic concepts in C++
4	Apply concepts like virtual functions and polymorphisms
5	Explain about the uses of files in C++

Mapping of Course Outcome with Programme Specific Outcome

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	3	3	3	3	3	2.8

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology :

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			
K2,K3	C - 2/4 X 20	500	40			

SEMESTER II

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/2C/PR2	C++ and Data Structures Laboratory	2	3	45 hrs Practical	0	0	3	40	60	100

Course Objective :

To enable the students

1. To develop C++ programs.
2. To read , understand and trace the execution of a program related to data structures
3. To solve real world problems using C++ language
4. To debug logical and syntax errors
5. To implement concepts like arrays, structures, files using C++

Course Outline :

1. Objects, classes.
2. Inheritance
3. Polymorphism.
4. Operator overloading.
5. Data type conversion.
6. Constructors, Pointers.
7. Virtual functions.
8. Friend Functions.
9. STACK implementation
10. QUEUE implementation

11. SINGLY LINKED LIST implementation
12. DOUBLY LINKED LIST implementation
13. TREE TRAVERSAL implementation

Course Outcome :

CO No.	CO Statement
1	Implement inheritance and polymorphisms concepts using C++ programs
2	Apply the concepts of constructors , virtual functions and operator overloading in programs
3	Design friend functions concepts
4	Demonstrate programs stack and queue concepts using C++
5	Develop programs to implement singly, doubly linked list and tree concepts using C++

Mapping of Course Outcome with Programme Specific Outcome

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology :

Practical demonstrations, Discussion, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A - 2 X 30	60	60	3 Hours

COURSE PROFILE SEMESTER III

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/3C/CCG	Computer Graphics	3	4	60	3	1	0	40	60	100
CA18/3C/CVP	Visual Programming	3	4	60 hrs	3	1	-	40	60	100
CA18/3C/RAO	RDBMS and ORACLE	3	4	60 Theory	3	1	0	40	60	100
CA18/3A/CFA	Allied – Financial Accounting	5	6	90 hrs (Theory)	5	1	-	40	60	100
CA18/3C/PR3	VB and ORACLE Laboratory	3	5 hrs	75 hrs	0	0	4	40	60	100
CA18/3C/PR4	Computer Graphics using C Laboratory	2	3	45	0	0	3	40	60	100

SEMESTER - III

Course Code	Course Name	Credits	Hrs/ Week	Total Hrs	L	T	P	CA	SE	Total
CA18/3C/CCG	Computer Graphics	3	4	60	3	1	0	40	60	100

Course Objectives:

To enable the students

1. To import knowledge about graphics display devices.
2. To study the graphics algorithms.
3. To introduce two dimensional and three dimensional transformations.
4. To explore two dimensional and three dimensional viewing.
5. To study Hidden surface and hidden lines removal

Course Outline:

Unit - I:

Introduction to computer Graphics - Video display devices- Raster scan Systems -Random Scan Systems - Interactive input devices - Hard copy devices - Graphics software - Output primitives - line drawing algorithms - initializing lines - line function - circle Generating algorithms.

[10 hrs]

Unit - II

Attributes of output Primitives - line attributes - Color and Grayscale style - Area filling algorithms - Character attributes inquiry functions - Two dimensional transformation - Basic transformation - Composite transformation - Matrix representation - other transformations.

[15 hrs]

Unit - III

Two - dimensional viewing - window- to view port co-ordinate transformation - clipping algorithms - Interactive input methods - Physical input devices - logical classification of input devices - Interactive picture construction methods.

[10 hrs]

Unit - IV

Three - dimensional concepts - Three dimensional display methods - parallel Projection - Perspective Projection - Depth Cueing - Visible line and surface identification -Three dimensional transformation.

[15 hrs]

Unit - V

Three dimensional viewing - Projection - Viewing transformation - implementation of viewing operations - Hidden surface and Hidden line removal - backface removals.

[10 hrs]

Recommended Textbooks:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1	Computer Graphics	D.Hearn and M.P.Baker	Prentice Hall of India	1997.

Reference Books:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1	Principles of Interactive Computer Graphics -	. W.M. Newman and RF.Sproull	McGraw Hill International Edition	1979.

E-Learning Resources:

S. No	URL
1	http://www.tutorialspoint.com/computer_graphics/
2	http://www.ddegjust.ac.in/
3	www.rw-designer.com

Course Outcomes:

CO No.	CO Statement
CO 1	Utilize the basic components in computer graphics
CO 2	Demonstrate various algorithms like line drawing and circle drawing
CO 3	Apply 2D and 3D transformations
CO 4	Learn viewing and clipping
CO 5	Understand hidden surface and hidden line removal

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	1	3	2	3	3
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	2
CO 5	3	3	3	3	3	1
AVERAGE	3	2.6	3	2.8	3	2.2

Key: Strongly Correlated-3 Moderately Correlated - 2 Weakly Correlated - 1 No Correlation -0

Teaching Methodology:

Lecture by chalk and talk, OHP, e- content, Problem Solving, Group Discussion, Assignment, Quiz

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Special Instruction if any
K1	A – 10 x 2 Marks	50	20	100	
K1, K3	B – 5/7 x 8 Marks	250	40		
K2, K3	C – 2/4 x 20 Marks	500	40		

SEMESTER-III

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/3C/CVP	Visual Programming	3	4 hrs	60 hrs	3	1	-	40	60	100

Course Objective:

To enable the students to

1. Use a modern IDE to visually and programmatically create programs with GUI's.
2. Use the event-driven model and its interaction with the modern multitasking operating system.
3. Design and implement applications using common controls, advanced controls and exceptional handling.
4. Debug the menu driven and event driven programming model.
5. Connect the front-end with the backend tool like Oracle using files, streams and database.

Course Outline:

Unit – I:

Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers. (15 hrs)

Unit – II:

Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures. (10 hrs)

Unit – III:

Lists - Arrays – Sorting and Searching - Records - Control Arrays – List and Combo Boxes - Flex Grid Control - Projects with Multiple forms - Do Events and Sub Main - Error Trapping. (10 hrs)

Unit – IV:

VB Objects – Common Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization. (10 hrs)

Unit – V:

Monitoring Mouse activity- File Handling – Sequential Files – Random Access Files – Binary Files - File System Controls - File System Objects - COM/OLE – OLE automation - DLL Servers - OLE Drag and Drop. (15 hrs)

Recommended Text Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1.	Visual Ground up Basic 6 from the	Gary Cornell	Tata McGraw Hill	1999

Reference Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1.	Visual Basic 6 (The Complete Reference)	Noel Jerke	Tata McGraw Hill	1999

E-Learning Resources:

S.No.	URL
1	www.vbtutor.net/vbtutor.html
2	www.freetutes.com/learn-vb6
3	www.thecodingguys.net/tutorials/visualbasic

Course Outcome:

CO No.	CO Statement
1	Ability to use Graphical User Interface and using the IDE with its design and diagramming tools
2	Ability to use Control Structures, elementary data structures, collection classes and Event-driven Programming.
3	Ability to use advanced controls like Flex Grid and Exception handling.
4	Ability to view and debug the Windows Forms, common controls, design-view, code view, class diagram view and create menu driven application.
5	Create application using Files and Streams, simple database usage

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	3	3	3	3	3	2.6

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			
K2,K3	C - 2/4 X 20	500	40			

SEMESTER III

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/3C/RAO	RDBMS and ORACLE	3	4	60 Theory	3	1	0	40	60	100

Course Objective :

To enable the students

1. To make them write their own SQL Queries.
2. To develop programs using PL/SQL
3. To solve real world problems using Oracle
4. To enhance knowledge about DBMS and RDBMS concepts
5. To enrich knowledge about the concepts of personal and client/server architecture

Course Outline :

Unit - I:

Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams – Denormalization.(10 hrs)

Unit - II:

Oracle9i: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors & Help – Alternate Text Editors - SQL *Plus Worksheet - iSQL *Plus. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types. (15 hrs)

Unit - III:

Working with Table: Data Management and Retrieval: DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions –Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations. (15 hrs)

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. 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. (10 hrs)

Unit - V:

PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views. (10 hrs.)

Recommended Text Books

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1	Database Systems Using ORACLE	Nilesh Shah	PHI 2 nd edition	2009.
2	Database Management systems	Arun Majumdar & Pritimoy Bhattacharya	TMH	2007

Reference Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1	Database Management System	Gerald V. Post	TMH 5 rd edition	2005

E-Learning Resources:

S.No.	URL
1	www.smart-soft.co.uk/Oracle/oracle-tutorial.html
2	www.oracle-dba-online.com/sql/oracle_sql_tutorial.html
3	www.javatpoint.com/oracle-tutorial
4	www.tutorialspoint.com/dbms/index.html

Course Outcomes :

CO No.	CO Statement
1	Discuss about DBMS and RDBMS concepts
2	Explain about DDL commands in SQL
3	Demonstrate DML commands using queries
4	Apply the concepts of PL/SQL programming
5	Design PL/SQL programs using triggers, procedures and functions

Mapping of Course Outcome with Program Specific Outcome :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3
Average						2.9

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology :

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			
K2,K3	C - 2/4 X 20	500	40			

SEMESTER III

Course Code	Course Name	Credits	Hours Per Week	Total Hrs	L	T	P	CA	SE	Total
CA18/3A/CFA	Allied – Financial Accounting	5	6	90 hrs (Theory)	5	1	-	40	60	100

Course Objectives:

To enable the students

1. To inculcate basic accounting Knowledge.
2. To explain the steps how to record the transaction in Financial Accounting.
3. To understand information contained in the published financial statements of companies and other organizations.
4. To learn to prepare the Final Account.
5. To study the concept of depreciation.

Course Outline:

Unit - I:

Introduction to Accounting: Definition - Attributes and Steps of Accounting -Objectives, Advantages and Limitations - Groups interested in Accounting Information - Branches of Accounting - Methods of Accounting - Types of Accounts-Accounting Rules. Basic Accounting Concepts and Conventions - Accounting Equation. [15 hours]

Unit - II:

Journal – Transaction analysis for Journal Entries – Ledger – Account – Posting of Journal to Ledger – Balancing of Ledger Accounts – Cash Book – Simple Cash book – Two column cash book with cash and discount columns – Two column cash book with bank and discount columns – Three column cash book. [15 hours]

Unit - III :

Trial balance – Rectification of Errors – Suspense Account – Bank Reconciliation Statement. [20 hours]

Unit IV:

Final Accounts: Trading Account – Profit and Loss Account – Balance Sheet – Adjustments. [20 hours]

Unit - V:

Depreciation Accounting: Meaning – Characteristics – Causes – Methods of recording Depreciation – Methods of providing depreciation – Fixed percentage on original cost – Fixed percentage on diminishing balance (including change in the method of depreciation). [20 hours]

Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Financial Accounting	T.S. Reddy, A. Murthy	Margham	2018

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Advanced Accountancy	Gupta R.L., M. Radhaswamy	Sultan Chand & Sons	2011
2.	Financial Accounting	S. Manikandan	Scitech	2011

E-Learning Resources:

1	http:// www.tutorialspoint.com/financial accounting
2	https:// www.accountingverse.com/financial accounting

Course Outcomes:

CO No.	CO Statement
CO 1	State the uses and users of accounting information
CO 2	Students should be able to record basic accounting transaction
CO 3	Analyse, interpret and communicate the information contained in basic financial statements and also explain the limitations
CO 4	Describe the main elements of financial accounting information – assets, liabilities, revenue and expenses
CO 5	Compute the different types of depreciation and their purposes.

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	3	1	1	1
CO 2	1	1	2	1	2	2
CO 3	1	2	1	2	1	3
CO 4	1	2	3	2	2	3
CO 5	1	1	2	2	2	3

AVERAGE	1	1.6	2.2	1.6	1.6	2.4
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Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, Correlated - 0

No

Teaching Methodology:

Lecture (Chalk and Talk), Problem Solving, Group Discussion, Assignment, Quiz, Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	TIME
K1	A – 10 x 2 Marks	50	20	100	3HRS
K1,K2	B – 5/7 x 8 Marks	250	40		
K2,K3	C – 2/4 x 20 Marks	500	40		

SEMESTER-III

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/3C/PR3	VB and ORACLE Laboratory	3	5 hrs	75 hrs	0	0	4	40	60	100

Course Objective:

To enable the students to

1. Identify and use the features of a Visual Basic (VB) development environment.
2. Create graphic user interface programs using introductory concepts involved in visual basic and table creation in Oracle.
3. Use the properties and methods of forms and controls to create VB programs and procedures to perform input, processing and output.
4. Deal with editors, tools and Debugging techniques.
5. Design a window application with Oracle as backend.

Course Outline:

Creation of a Database and performing the operations given below using a Menu Driven Program.

- a) Insertion
- b) Deletion
- c) Modification
- d) Generating a Simple report

1. Payroll
2. Mark sheet Processing
3. Invoice system
4. Library information system
5. Student information system
6. Income tax processing system

Course Outcome:

CO No.	CO Statement
1	Analyze and write meaningful name for variables, controls and definition.
2	Design and develop the connectivity between the frontend and backend.
3	Apply the technique of changing the properties of the controls during runtime and design time.
4	Write and Execute the operations in a table such as add, delete, update, save and view.
5	Build reports.

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	1	3	1	1
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	2.6	2.6	2.6	3	2.6	2.6

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Practical demonstrations, Discussion, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A - 1 X 60	60	60	3 Hours

SEMESTER – III

Course Code	Course Name	Credits	Hrs/ Week	Total Hrs	L	T	P	CA	SE	Total
CA18/3C/PR4	Computer Graphics using C Laboratory	2	3	45	0	0	3	40	60	100

Course Objectives:

To enable the students

1. To understand the need of developing graphics application.
2. To learn algorithmic development of graphics primitives like: line, circle,
3. To introduce representation and transformation of graphical images and pictures.
4. To explore two dimensional and three dimensional composite transformations.
5. To introduce clipping.

Course Outline:

1. Implementation of Bresenham's Algorithm – Line, Circle.
2. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection
3. Composite 2D Transformations
4. Cohen Sutherland 2D line clipping.
5. Three dimensional transformations - Translation, Rotation, Scaling
6. Composite 3D transformations
7. Drawing an Image using Geometric Function.

Course Outcomes:

CO No.	CO Statement
CO 1	Create simple graphics applications
CO 2	Analyze Geometric primitives
CO 3	Demonstrate transformation of graphical images and pictures
CO 4	Explain composite transformations on objects
CO 5	Prepare clipping algorithm on lines

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
CO 6	3	3	3	3	3	3
AVERAGE	3	3	3	3	3	3

Key: Strongly Corelated-3 Moderately Corelated - 2 Weakly Corelated - 1 NoCorrelation -0

Teaching Methodology:

Practical Demonstrations, Discussion, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Marks	Total	Time
K2, K3, K4, K5, K6	A – 2 X 30	60	60	3 Hours

COURSE PROFILE SEMESTER IV

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/4C/PJP	Programming in Java	3	4	60	3	1	-	40	60	100
CA18/4C/COS	Operating System	3	4	60	3	1	0	40	60	100
CA18/4C/CSA	Computer System Architecture	3	4	60	3	1	-	40	60	100
CA18/4A/CMA	Allied – Management Accounting	5	6	90 hrs (Theory)	5	1	-	40	60	100
CA18/4C/PR5	Java Laboratory	3	5	75	0	0	3	40	60	100
CA18/4C/PO1	Term Paper and Seminar	2	3	45	0	0	3	40	60	100

SEMESTER IV

Course Code	Course Name	Credits	Hours/ Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/4C/PJP	Programming in Java	3	4	60	3	1	-	40	60	100

Course Objectives:

To enable the students

1. To impart knowledge about the basic concepts of OOPS and overview & evaluation of Java.
2. To use the concepts of Classes, Inheritance, Packages and Interfaces.
3. To learn exception handling, multithreading and string handling concepts in Java.
4. To inculcate knowledge about I/O concepts in Java.
5. To understand applet and event handling programming with HTML and to explore the Java Swing and Java Bean.

Course Outline:

Unit-I:

Introduction - Role of JAVA in Internet - Features - Overview of Java - Data Types, Variables, Arrays

[10 Hrs]

Unit-II:

Operators - Control statements – Classes, Methods – Inheritance – Packages and Interfaces

[10 Hrs]

Unit-III:

Exception Handling - Multithreaded Programming - String Handling – Wrapper Classes

[10 Hrs]

Unit-IV:

I/O Basics - Stream Classes – Byte Stream – Character Stream – Reading Console Input – Writing Console Output – Print Writer Class – Reading and writing Files

[15 Hrs]

Unit-V:

The Applet Class – Event Handling - Java Beans – Advantages – Bean Developer Kit – JAR Files – Developing Simple Bean – JAVA Swing

[15 Hrs]

Recommended Textbooks:

S.No.	Title of the Book	Authors	Publishers	Year of Publication
1.	Java 2 – The Complete Reference.	Hebert Schildt	Tata McGraw Hill Publications.	Fifth Edition, 1999

Reference Books:

S.No.	Title of the Book	Authors	Publishers	Year of Publication
1.	Programming with Java – A Primer	E. Balagurusamy	Tata McGraw Hill Publications	Third Edition, 1998
2.	Programming With JAVA	John R. Hubbard	Tata McGraw Hill Publications	Second Edition, 1999

E-Learning Resources:

1	www.javatpoint.com
2	https://www.edureka.co/blog/java-tutorial/
3	https://beginnersbook.com/java-tutorial-for-beginners-with-examples

Course Outcomes:

CO No.	CO Statement
1	Discuss the basic oops concept, evaluation and implementation overview of java.
2	Design the applications using classes, inheritance, packages and interface.

3	Use the exception handling, multithreading and string handling concepts in various applications.
4	Demonstrate knowledge about I/O concepts in Java.
5	Able to perform applet programming designing HTML, Java Swing and Java Bean based programs.

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Peer Learning, Assignment.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word Limit	Marks	Total	Time	Special instructions if any
K1	A – 10 x 2	50	20	100	3 Hrs.	
K1, K3	B – 5/8 x 8	250	40			
K2, K3	C – 2/4 x 20	500	40			

SEMESTER – IV

Course Code	Course Name	Credits	Hrs/Week	Total Hrs	L	T	P	CA	SE	Total
CA18/4C/COS	Operating System	3	4	60	3	1	0	40	60	100

Course Objectives:

To enable the students

1. To understand the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication.
3. To know the mechanisms involved in memory management
4. To gain knowledge on Mutual exclusion algorithms and deadlock algorithms.
5. To study the file system, directory and disk management

Course Outline:

Unit I

Introduction: Views- Goals - Types of System- OS Structure - Components – Services. Process Concept – Process Scheduling – Operation on Processes – Cooperating Processes – Inter process Communication – Basic Concepts of CPU Scheduling – Scheduling Criteria – Scheduling Algorithms.

(10 hrs)

Unit II

Process Synchronization – The Critical Section Problem – Synchronization Hardware –Semaphores – Classic Problems of Synchronization – Deadlock Characterization – Methods for handling deadlocks- Deadlock Prevention – Deadlock Avoidance –Deadlock Detection – Recovery from deadlock.

(10 hrs)

Unit III

Memory Management: Address Binding – Dynamic Loading and Linking – Overlays –Logical and Physical Address Space – Contiguous Allocation - Internal and External Fragmentation. Non –Contiguous Allocation: Paging and Segmentation Schemes – Implementation –Hardware –Protection – Sharing – Fragmentation.

(10 hrs)

Unit IV

Introduction to Virtual Memory – Demand Paging – Process Creation – Page Replacement – Allocation of Frames – Thrashing.

(15 hrs)

Unit V

File-System Structure – File-System Implementation – Directory Implementation – Allocation Methods – Free-Space Management – Efficiency and Performance – Recovery – Log-Structured File System - Disk Structure – Disk Scheduling –Disk Management – Swap- space Management.

(15 hrs)

Recommended Text Books:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1	Operating System Concepts	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	John Wiley and Sons	2002

Reference Books:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1.	Operating system	Stallings	Tata McGraw Hill	2002
2.	Operating system	Godbole Kahate	Tata Mc Graw Hill	2000

E - Learning Resources:

S. No.	URL
1	https://codescracker.com/operating-system
2	www.tutorialspoint.com

Course Outcomes:

CO No.	CO Statement
CO 1	Analyze the structure of OS and basic architectural components involved in OS design
CO 2	Analyze the applications to run in parallel either using process or thread models
CO 3	Analyze the various device and resource management techniques for timesharing and distributed systems
CO 4	Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO 5	Interpret the mechanisms adopted for file system, directory and disk

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	3	1
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
AVERAGE	3	3	3	2.8	3	2.6

Teaching Methodology:

Lecture by chalk and talk, OHP, e- content, Problem Solving, Group Discussion, Assignment, Quiz

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Special Instruction if any
K1	A – 10 x 2 Marks	50	20	100	
K1, K3	B – 5/7 x 8 Marks	250	40		
K2, K3	C – 2/4 x 20 Marks	500	40		

SEMESTER IV

Course Code	Course Name	Credits	Hours / Week	Total Hours	L	T	P	CA	SE	TOTAL
CA18/4C/CSA	Computer System Architecture	3	4	60	3	1	-	40	60	100

Course Objectives:

1. To study the various representations of data, register transfer language for micro- operations and organization and design of a digital computer.
2. To teach the concept of micro-programmed control unit, the central processing unit, stack and instruction formats.
3. To Study the various arithmetic operation's algorithms and their hardware implementations and concept of pipelining and vector processing.
4. To illustrate the techniques to communicate with input and output devices.
5. To study the organization and operation of various memories and memory management hardware.

Course Outline:

Unit I:

Register transfer and micro operations: Register transfer language, register transfer, bus and memory transfers, arithmetic micro-operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit. Basic computer organization and design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input-output and interrupt. (10 hrs)

Unit II :

Central processing unit: General register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control. (10 hrs)

Unit III :

Pipeline and vector processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing array processors. (10 hrs)

Unit IV :

Input-output organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access, input-output processor, serial communication. (15 hrs)

Unit V:

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware. (15 hrs)

Recommended Text Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Computer System Architecture	Morris Mano	3 rd Edition, Pearson Education, PHI	2002

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Computer Systems and Design Architecture	Vincent P.Heuring and Harry F.Jordan	Pearson Education Asia Publications	2002
2.	Computer Architecture and Organization	John P.Hayes	Tata McGraw Hill	1988
3.	Structured Computer Organization	Andrew S.Tanenbaum	4th Edition, Prentice Hall of India / Pearson Education	2002
4.	Computer Organization and Architecture	William Stallings	6th Edition, Prentice Hall of India / Pearson Education	2003

E-Learning Resources:

1	https:// www.freebookcentre.net
2	https:// www.williamstallings.com
3	https:// www.cs.iastate.edu

Course Outcomes:

CO No.	CO Statement
CO 1	Outline the detailed design of digital computer
CO 2	Compare various instruction format and addressing modes
CO 3	Discuss about pipeline processing

CO 4	Describe the organization of input and output devices
CO 5	Explain memory management techniques

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	3	3	3	3	3	2.6

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1,

No Correlation – 0

Teaching Methodology:

Lecture by chalk and talk, OHP, e-content, Group Discussion, Assignment, Quiz, LCD and Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Time
K1	A – 10 x 2 Marks	50	20	100	3 Hrs
K1 , K3	B – 5/7 x 8 Marks	250	40		
K2 , K3	C – 2/4 x 20 Marks	500	40		

SEMESTER IV

Course Code	Course Name	Credits	Hours Per Week	Total Hrs	L	T	P	Ca	Se	Total
CA18/4A/CMA	Allied –Management Accounting	5	6	90 hrs (Theory)	5	1	-	40	60	100

Course Objectives:

To enable the students

1. To impart education about the principles and practices followed in the field of management accounting.
2. To familiarize with management tools such funds flow & cash flow statement, Ratio analysis, budgets and variance.
3. To develop skills of decision making in management accounts for efficient management.
4. To learn how to prepare the various types of budgets like master budget, production budget, sales budget, cash budget and flexible budget.
5. To perform cost variance analysis and prepare analyses of various special decision using relevant costing and benefits.

Course Outline:

Unit I :

Management accounting – Meaning, Scope, Importance and Limitations – Management accounting Vs Cost accounting – Management accounting vs. Financial accounting.

[15 hours]

Unit II :

Funds flow and Cash flow statements as per AS3.

[20 hours]

Unit III :

Ratio analysis – Advantages and Disadvantages - Classification of ratios: Profitability, Turnover, Coverage and Financial –DU PONT Control Chart (Theory).

[20 hours]

Unit IV:

Budgets and budgetary control – Meaning – Advantages – Limitations – Installation of Budgetary control system – Classification of Budgets based in time, functions and flexibility-Sales budget, Production budget, Cost of Production budget, Cash budget and Flexible budget. (Simple problems only)

[20 hours]

Unit V:

Standard costing and Variance analysis – meaning of Standard cost – significance of variance analysis – analysis of cost variances – material, labour variances.

[15 hours]

Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Management accounting	Dr.S.N.Maheswari	Sultan Chand & Sons	2012

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Advanced Accountancy, Volume II	Gupta R.L., M. Radhaswamy	Sultan Chand & Sons	2012
2.	Management Accounting	N.M. Singhvi, Ruzbeh J. Bodhanwala	PHI Learning	2010

E-Learning Resources:

1	http:// www.wiziq.com/management-accounting
2	https:// www.dailymotion.com/video/x20ep75
3	http:// www.tutorialspoint.com / Accounting Basics/ Management A/c

Course Outcomes:

CO No.	CO Statement
CO 1	Critically analyse and provide recommendations to improve the operations of organisations through the management tools.
CO 2	Apply managerial accounting in such a way to demonstrate a clear understanding of ethical responsibilities.
CO 3	Develop and apply standards and budgets for planning and controlling purposes.
CO 4	Analyze various types of variances with their implication in standard costing.
CO 5	Apply incremental analysis to a range of business scenarios

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	2	2	1	3
CO 2	1	2	2	2	1	3
CO 3	1	2	2	2	1	3
CO 4	1	2	2	2	1	3
CO 5	1	2	2	2	1	3
AVERAGE	1	2	2	2	1	3

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, Correlated - 0

No

Teaching Methodology:

Lecture (Chalk and Talk), Problem Solving, Group Discussion, Assignment, Quiz, Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Time
K1	A – 10 x 2 Marks	50	20	100	3HRS
K1,K2	B – 5/7 x 8 Marks	250	40		
K2,K3	C – 2/4 x 20 Marks	500	40		

SEMESTER IV

Course Code	Course Name	Credits	Hours/ Wk	Total hrs	L	T	P	CA	SE	Total
CA18/4C/PR5	Java Laboratory	3	5	75	0	0	3	40	60	100

Course Objectives:

To enable the students

1. To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
2. To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
3. To discuss the principles of inheritance, interface and packages and demonstrate through problem analysis assignments.
4. To understand importance of Multi-threading & different exception handling mechanisms.
5. To learn experience of graphical user interfaces in Java using applet and AWT that respond to different user events, creating Java Swing elements and Java Bean.

Course Outline:

1. Classes and objects
2. Arrays
3. Vectors
4. Thread
5. Exception handling
6. Inheritance
7. Interfaces
8. Packages
9. Applet Program
10. Event Handling
11. File Handling
12. JDBC
13. Java Beans Components
14. Swing Components

Course Outcomes:

CO No.	CO Statement
1	Able to understand concept of Object Oriented Programming & Java Programming constructs.
2	Able to understand basic concepts of Java such as operators, classes, objects, inheritance, packages and Enumeration
3	Able to understand the concept of exception handling and Input/output operations
4	Able to design the application of Java and Java applet
5	Able to design the concept of Event Handling, Abstract windows toolkit, Java Bean and Java Swing.

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	3	3	3	3	3	2.8

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Practical demonstrations, Discussions, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A - 2 X 30	30	60	3 Hours

SEMESTER IV

COURSE CODE	COURSE NAME	Credits	Hours / Week	Total Hours	L	T	P	CA	SE	TOTAL
CA18/4C/PO1	Term Paper and Seminar	2	3	45	0	0	3	40	60	100

Course Objectives:

To enable the students

1. To create desire for continuous learning.
2. To develop interpersonal and communication skills.
3. To make the students to develop critical thinking and problem solving skills.
4. To get Knowledge in windows and Ms Office to draft the report
5. To set the stage for future recruitment by potential employers.

Course Outline:

Any Computer related topic should be chosen as a term paper and it should be presented as a Seminar at the end of the semester.

Course Outcomes:

CO No.	CO Statement
CO 1	Identify , select and learn about a specific domain
CO 2	Analyze, design and implement algorithms
CO 3	Interpret results using Statistical measures

Mapping of Course Outcome with Programme Specific Outcome:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key : Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1,
No Correlation – 0

Question Paper Pattern:

Practical	Total
Presentation and Viva-Voce	60

COURSE PROFILE SEMESTER V

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/5C/DNT	Dot Net Technologies	4	5	75	3	2	0	40	60	100
CA18/5C/CSE	Software Engineering	4	5	75	3	2	-	40	60	100
CA18/5C/WEB	Web Technology	4	5	75	3	2	-	40	60	100
CA18/5E/CDM	Elective I – Data Mining	4	5	75	3	2	-	40	60	100
CA18/5E/AIM	Elective I: AI and Machine Learning	4	5	75	4	3	-	40	60	100
CA18/5C/PR6	Dot Net Laboratory	3	5	75	0	0	5	40	60	100
CA18/5C/PR7	Web Technology Laboratory	3	5	75	0	0	5	40	60	100

SEMESTER - V

Course Code	Course Name	Credits	Hrs/ Week	Total Hrs	L	T	P	CA	SE	Total
CA18/5C/DNT	Dot Net Technologies	4	5	75	3	2	0	40	60	100

Course Objectives:

To enable the students to

1. Set up a programming environment for VB.NET.
2. Develop a data driven web application.
3. Set up a programming environment for ASP.NET programs.
4. Configure an ASP.NET application.
5. Creating ASP.NET applications using standard .net controls

Course Outline:

Unit - I

The Visual Basic .NET Development Environment – Elements of VB.NET – Lexical Elements – Preprocessing Directives – General Concepts – Option, Imports, Namespace Directives – Types – Type Members – Statements and Blocks – Expressions – VB.NET Operators – Conditional Structures and Control flow. [15 Hrs]

Unit - II

Interfacing with End User – Windows Forms – MDI Applications – Components and Controls – Menus and Toolbars – Responding to User Input – Collecting User Input – Presentation and Informational Controls – Drag and Drop operations. [15 Hrs]

Unit - III

ASP.NET Language Structure – HTML Server Controls – Basic Web Server Controls – Data List Web Server Controls – Other Web Server Controls [15 Hrs]

Unit - IV

IE Web Controls – TreeView Control – Toolbar Control – Tabstrip and Multipage Controls –Request and Response Objects – OLEDBConnection Class - OLEDBCommand Class - OLEDBTransaction Class – OLEDBDataAdapterClass – DataSet Class – Sample Applications [15 Hrs]

Unit – V

Advanced Issues – E-Mail – Application Issues – Working with IIS and Page Directives –Error Handling –Security [15 Hrs]

Recommended Text Books:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1	The Complete Reference Visual Basic.NET	Jeffrey R.Shapiro	Tata McGraw Hill	2002
2	ASP.NET Developer's Guide	Greg Buczek,	Tata McGraw Hill	2002

Reference Books:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1	Visual Basic .NET Programming Bible	Bill Evjen, Jason Beres	Bible,Wiley	2002
2.	The Complete Reference ASP.NET	Matthew MacDonald	McGraw-Hill/Osborne,	2002

E - Learning Resources:

S. No	URL
1	www.tutorialspoint.com/vb.net
2	www.w3schools.com/aspnet
3	www.tutorialspoint.com/asp.net
4.	www.asp.net-tutorials.com

Course Outcomes:

CO No.	CO Statement
CO 1	Describe the basic structure of a VB.NET project and use main features of IDE
CO 2	Debug and deploy VB.NET web applications
CO 3	Design web applications using ASP.NET
CO 4	Use ASP.NET controls in web applications.
CO 5	Create database driven ASP.NET web applications and web services

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
AVERAGE	3	3	3	3	3	3

Teaching Methodology:

Lecture by chalk and talk, OHP, e- content, Problem Solving, Group Discussion, Assignment, Quiz

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Special Instruction if any
K1	A – 10 x 2 Marks	50	20	100	
K1, K3	B – 5/7 x 8 Marks	250	40		
K2, K3	C – 2/4 x 20 Marks	500	40		

SEMESTER V

Course Code	Course Name	Credits	Hours/ Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/5C/CSE	Software Engineering	4	5	75	3	2	-	40	60	100

Course Objective:

To enable the students

1. To know about the evolving and changing nature of software along with software myths and the standards for software process.
2. To impart knowledge about the software development life cycle models employed in the Industry.
3. To inculcate the knowledge of requirement engineering and system models.
4. To understand the design process for representation of the system and metrics for analyzing the system.
5. To study about various functional and non functional testing used to identify the defects in the software.

Course Outline:

Unit I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. [15 hrs]

Unit II:

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process. Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. [15hrs]

Unit III:

Requirement engineering process: Feasibility studies, Requirement elicitation and analysis, Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods. [15 hrs]

Unit-IV:

Design Engineering: Design process and Design quality, Design concepts, The design model. Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design. [15 hrs]

Unit-V:

Testing Strategies: A strategic approach to software testing , test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability. [15 hrs]

Recommended Text Books:

S.No.	Title of the book	Authors	Publishers	Year of Publications
1.	Software Engineering, A Practitioner's Approach.	Roger S.Pressman	McGrawHill international Edition.	6th Edition, 1982

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publications
1.	Software Engineering	K.K Aggarwal and Yogesh Singh	New International Age Publishers	2008
2.	Software Engineering	Sommerville	Pearson Education.	7th Edition, 1982
3.	Software Engineering, An Engineering Approach	James F.Peters	John Wiely.	2007

4.	Software Engineering principles and practice.	Waman S Jawadekar	The McGraw Hill Companies	2000
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E-Learning Resources:

1	www.tutorialspoint.com/software_engineering
2	http://www.rspa.com/
3	https://www.guru99.com/software-engineering-tutorial.html
4	https://alison.com/courses/software-engineering

Course Outcomes:

CO No.	CO Statement
1	Demonstrate the software engineering and its changing nature.
2	Gain knowledge about the various process models to develop the software.
3	Use different techniques to prepare SRS and system design.
4	Prepare the detailed design document where it is the blueprint for implementation.
5	Apply the different testing techniques currently employed in industries to improve the quality of the software.

Mapping of Course Outcome with Programme Specific Outcome

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	3	3
CO 2	3	3	3	2	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	2	3	3
Average	3	3	3	2.4	3	3

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD. Seminar, Discussion, Quiz, Peer Learning, Assignment.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word Limit	Marks	Total	Time	Special instructions if any
K1	A – 10 x 2	50	20	100	3 Hrs.	-
K1, K3	B – 5/8 x 8	250	40			
K2, K3	C – 2/4 x 20	500	40			

SEMESTER V

Course Code	Course Name	Credits	Hours Per Week	Total Hrs	L	T	P	CA	SE	Total
CA18/5C/WEB	Web Technology	4	5	75 hrs (Theory)	3	2	-	40	60	100

Course Objectives:

To enable the students

- 1.To inculcate knowledge on designing webpage using HTML and DHTML
- 2.To study the creation of interactive web pages using JavaScript and JQuery.
- 3.To develops the skills to create server-side scripts using PHP.
- 4.To learn how to display and insert data using PHP and MYSQL.
- 5.To impact knowledge of Python language and also learn how to connect Python programs to a database.

Course Outline:

Unit - I

Internet Basic - Introduction to HTML – Adding Graphics to HTML Doc - List - Creating Table - Linking document - Frames –Dynamic HTML: Cascading Style sheets - Style sheet basic - Add style to document – Font Attributes, Color and Background Attributes, Text Attributes, Border Attributes, Class, External Style sheets,<DIV>....</DIV> Tag. Introduction to JavaScript: Advantage of JavaScript - JavaScript Syntax – Data types - Variable - Array - Operator and Expression – Conditional Checking-Looping [15 hours]

Unit - II

Constructor - Function – User defined functions-Dialog box. JavaScript document object model - Introduction - Object in HTML –Browser Objects - Event Handling - Form Object - Built in Object - User defined object – Cookies – Introduction to jQuery: Selectors and methods – Events and functions – Web page manipulation – Effects and Animation. [15 hours]

Unit - III

PHP : Basics of PHP Scripts-Flow Control Functions-Working with Functions –Working with Strings,Dates and Time. [15 hours]

Unit – IV

Working with Forms, Cookies and Sessions – PHP and MySQL Integration: Learning Basic SQL Commands-Interacting with MySQL Using PHP. [15 hours]

Unit –V

Python: Data types: Boolean – numbers – list – tuple – set – dictionaries. String: formatting strings – other common methods. Regular expressions. Closure and generators: List of functions – list of patterns – file of patterns – generators. Functions: Defining – calling – types. Input/Output: Printing on screen – reading a data from keyboard – opening and closing a file – reading and writing a file – file functions.

[15 hours]

Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Web Enable Commercial Application Development Using HTML, Javascript, DHTML and PHP	Ivan Bayross	BPB	4 th Revised Edition 2010
2.	Sams Teach Yourself, PHP, MySQL and Apache	Julie C. Meloni	Pearson	5 th Edition
3.	Head First JQuery: A Brain – Friendly Guide	Benedetti, Ryan and Ronan Cranley	O'Reilly Media	2011
4.	Dive into Python	Mark Pilgrim	Createspace	2009

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Mastering Javascript	J. Jaworski	BPB	1999
2.	Complete Reference HTML	T. A. Powell	TMH	2002
3.	Web Technology & Design	C. Xavier	New Age International	2012
4.	Learning Python	Mark Lutz and David Ascher	O'reilly	5 th Edition 1999

E-Learning Resources:

1	http:// www.w3schools.com
2	https:// www.tutorials.com/javascript
3	http:// www.tutorialspoint.com/php/
4	http:// www.tutorialspoint.com/python/
5	http://www.javapoint.com/jquery

Course Outcomes:

CO No.	CO Statement
CO 1	Use knowledge of HTML and CSS code to create personal or business websites following current professional or industry standards.
CO 2	Write applications that manipulate the Document Object Model to fetch and display information using jQuery.
CO 3	Discuss the concepts of PHP and its advantages over other languages.
CO 4	Create, backup and restore a MYSQL database and to apply their knowledge to the creation of dynamic web applications such as content management, user registration and e-commerce.
CO 5	Create and execute python programs and ability to perform the data manipulation using python.

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	2	2	3	2	2
CO 2	3	3	3	3	3	3
CO 3	2	2	2	2	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
AVERAGE	2.6	2.6	2.6	2.8	2.8	2.6

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, Correlated - 0

No

Teaching Methodology:

Lecture (Chalk and Talk), Problem Solving, E-Content, Peer Learning, Group Discussion, Assignment, Quiz, Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Time
K1	A – 10 x 2 Marks	50	20	100	3HRS
K1,K2	B – 5/7 x 8 Marks	250	40		
K2,K3	C – 2/4 x 20 Marks	500	40		

SEMESTER V

Course Code	Course Name	Credits	Hours / Week	Total Hours	L	T	P	CA	SE	TOTAL
CA18/5E/CDM	Elective I – Data Mining	4	5	75	3	2	-	40	60	100

Course Objectives:

To enable the students

1. To know about knowledge discovery and to find interesting patterns in large data repositories.
2. To study various classification methods.
3. To describe basic concepts in clustering.
4. To know about the developing areas in web mining.
5. To introduce the concept of search engines and data warehousing.

Course Outline:

Unit - I

Introduction - Data Mining applications – Data Mining techniques – Data Mining case studies- The future of data mining – Data Mining software - Association rule mining - Introduction- basics- The task and a naive algorithm- Apriori algorithm – Improving the efficiency of the Apriori algorithm – FP-Growth
[15 Hrs]

Unit – II

Classification - Introduction – Decision Tree – The Tree Induction Algorithm - Over fitting and pruning - DT rules - Estimating predictive accuracy - Other evaluation criteria – Classification software
[15 Hrs]

Unit – III

Cluster analysis - Features – Types of data – Computing distances - Types of cluster analysis methods - partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity – cluster analysis software.
[15 Hrs]

Unit – IV

Web data mining – Introduction - Web terminology and characteristics - locality and hierarchy in the web - web content mining - web usage mining - web structure mining – web mining software
[15 Hrs]

Unit – V

Search engines - Search engines functionality- Search engines architecture – Ranking of web pages - Introduction to Data Warehouses – Data Warehouse Design – Guidelines for Data Warehouse implementation - Data Warehouse Metadata
[15 Hrs]

Recommended Text Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Introduction to Data mining with case studies	G.K. Gupta	PHI Private limited	2008

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Data mining	Kargupta	PHI Private limited	2004
2.	Data Mining Concepts and Techniques	Jiawei Han and Micheline Kamber	Second Edition, Elsevier	2000

E-Learning Resources:

1.	https://www.tutorialspoint.com/data_mining/
2.	http://www.zentut.com/data-mining/

Course Outcomes:

CO No.	CO Statement
CO 1	Create association rule in the transaction database
CO 2	Evaluate the performance of different classification algorithms
CO 3	Analyze various algorithms in clustering techniques
CO 4	Design new algorithms for web content, structure and usage mining
CO 5	Design a datamart or datawarehouse for any organization

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key : Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1,
No Correlation – 0

Teaching Methodology:

Lecture by chalk and talk, OHP, e-content, Group Discussion, Assignment, Quiz, LCD, Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Time
K1	A – 10 x 2 Marks	50	20	100	3 Hrs
K1 , K3	B – 5/7 x 8 Marks	250	40		
K2 , K3	C – 2/4 x 20 Marks	500	40		

SEMESTER – V

Course Code	Course Name	Credits	Hours/ Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/5E/AIM	Elective I: AI and Machine Learning	4	5	75	4	3	-	40	60	100

Course Objective:

To enable the students

1. To know about Artificial Intelligence problems and techniques to solve it.
2. To use various Artificial Intelligence searching algorithms.
3. To understand the fundamentals of knowledge representation.
4. To provide an overview of Machine Learning.
5. To prepare and evaluate a model.

Course Outline :

Unit – I:

Artificial Intelligence : AI Problems – AI Techniques – Tic Tac Toe . Problems, Problem spaces, and search: Defining the problem of space search – state space search – Production Systems – Problem Characteristics – Production System Characteristics (15 hrs)

Unit – II:

Heuristic search techniques – Generate and test – Hill Climbing – Best First Search- OR Graphs – A* Algorithms – Problem Reduction – Constraint Satisfaction – Means Ends Analysis . Knowledge Representation issues : Representations and Mappings – Approaches (15 hrs)

Unit – III:

Using Predicate Logic: Representing in simple facts in logic – Representing instance and Isa Relationship – Computable functions and predicates – Resolution. Representing Knowledge using Rules : Procedural Vs Declarative Knowledge – Logic Programming – Forward Vs Backward Reasoning (15 hrs)

Unit – IV:

Introduction to Machine Learning : what is machine learning? – Types of machine learning – Applications of machine learning – Issues in machine learning. Preparing to Model: Machine Learning Activities- Types of Data – Data quality and remediation. (15 hrs)

Unit – V:

Modelling and Evaluation: Selecting a Model – Training a Model – Model representation and Interpretability - Model Performance and evaluation - Improving performance of a model. (15 hrs)

Recommended Textbooks:

S.No.	Title of the Book	Authors	Publishers	Year of Publications
1.	Artificial Intelligence	Elaine Rich	McCraw-Hill	1983
2.	Machine Learning	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Dass	Pearson India Education	2019

Reference Books :

S.No.	Title of the Book	Authors	Publishers	Year of Publications
1.	Foundation of Artificial Intelligence and Expert Systems	Janakiraman	Macmillan	2005

E-Learning Resources:

S.No	URL
1	https://www.javatpoint.com/artificial-intelligence-tutorial
2	https://www.tutorialspoint.com/artificial_intelligence/index.htm
3	https://www.edureka.co/blog/machine-learning-tutorial/
4	https://www.toptal.com/machine-learning/machine-learning-theory-an-introductory-primer

Course Outcomes:

CO No.	CO Statement
1	Demonstrate knowledge of the building blocks of Artificial Intelligence
2	Develop intelligent algorithm for constraint satisfaction problems
3	Represent knowledge using predicate logic
4	Got knowledge about the basic concepts of building Expert system
5	Analyze and design an Expert system

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	2	3	1	2	3	1
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	2.8	3	2.6	2.8	3	2.6

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD. Seminar, Discussion, Quiz, Peer Learning, Assignment.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word Limit	Marks	Total	Time	Special instructions if any
K1	A – 10 x 2	50	20	100	3 Hrs.	
K1,K3	B – 5/8 x 8	250	40			
K2,K3	C – 2/4 x 20	500	40			

SEMESTER V

Course Code	Course Name	Credits	Hours/ Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/5C/PR6	Dot Net Laboratory	3	5	75	0	0	5	40	60	100

Course Objectives:

Enable the students to

1. Introduce .Net IDE Component Framework.
2. Creating VB.net and ASP.net applications using standard .net controls.
3. Programming Concepts and MDI Applications in .Net Framework.
4. Inculcate knowledge about basic and data list web server controls.
5. Develop data driven applications.

Course Outline:

Visual Basic .NET

1. Menus and Toolbars.
2. Working with Arrays
3. Working with User Input Controls
 - a. Buttons
 - b. Text Boxes
 - c. Check Boxes
 - d. Radio Buttons
 - e. Combo Boxes
4. Working with MDI Applications
5. Drag and Drop operations.
6. VB .Net with database access.

ASP.NET

1. Working with basic web server controls
2. Working with data list web server controls.
3. Calendar and Ad Rotator Controls

4. Validation Controls.
5. Working with Database Connectivity

Course Outcomes:

CO No.	CO Statement
1	Use the IDE Framework of .Net.
2	Students will be able to design applications using standard .net controls.
3	Create user interactive web pages using .Net.
4	Create simple data binding applications using ADO.Net connectivity.
5	Students will be able to create database driven .Net web applications and web services.

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Practical demonstrations, Discussions, Program writing.

Question paper Pattern :

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A - 2 X 30	30	60	3 Hours

SEMESTER-V

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/5C/PR7	Web Technology Laboratory	3	5 hrs	75 hrs	0	0	5	40	60	100

Course Objective:

To enable the students to

1. Implement HTML commands and Cascading Style Sheets.
2. Implement scripting language to create interactive presentation effect.
3. Implement PHP programs to build dynamic web pages.
4. Write and build PHP programs along with MySQL.
5. Write and build simple Python programs.

Course Outline:

Creation of web pages using:

1. HTML with CSS
2. Javascript
3. JQuery
4. PHP
5. PHP and MySQL
6. Python

Course Outcome:

CO No.	CO Statement
1	Describe the basic HTML commands, hyperlinks and Cascading Style sheets.
2	Apply scripting languages in HTML document to add interactive components to web pages.
3	Illustrate the web PHP concept to create dynamic web pages.
4	Apply MySQL in PHP page to create interactive web pages.
5	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python

Mapping of Course Outcome with Programme Specific Outcome :

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	2	3	3	3	1
Average	3	2.8	3	3	3	2.6

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Practical demonstrations, Discussion, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A – 2 X 30	60	60	3 Hours

COURSE PROFILE SEMESTER VI

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/6C/DCN	Data Communications and Networking	4	5 hrs	75	3	2	-	40	60	100
CA18/6C/CCT	Computing Technologies	4	5 hrs	75 hrs	3	2	-	40	60	100
CA18/6C/CMM	Multimedia	4	5	75 hrs (Theory)	3	2	-	40	60	100
CA18/6E/IOT	Elective II : Internet of Things	4	5	75	3	2	-	40	60	100
CA18/6E/CCS	Elective II : Cyber Security	4	5 hrs	75 hrs	3	2	-	40	60	100
CA18/6C/PO2	Internship and Mini Project	4	5	75hrs Lab.	0	0	5	40	60	100
CA18/6C/PR8	Multimedia Laboratory	3	5	75 hrs (Practical)	0	0	5	40	60	100

SEMESTER VI

Course Code	Course Name	Credits	Hours / Week	Total Hours	L	T	P	CA	SE	TOTAL
CA18/6C/DCN	Data Communications and Networking	4	5 hrs	75	3	2	-	40	60	100

Course Objectives:

To enable the students

1. To inculcate the knowledge on basic networking concepts and OSI Model.
2. To understand the concepts of various error detection and correction methods.
3. To introduce multiplexing and switching concepts.
4. To make the students aware of technologies like ATM and ISDN.
5. To introduce internetworking devices.

Course Outline:

Unit – I

Introduction to Data Communication, Network Protocols & standards - Line Configuration - Topology - Transmission mode - Classification of Network. OSI Model : Layers of OS1 Model. [15 hrs]

Unit - II

Digital data transmission - DTE/DCE interface – Modems. Transmission media : Guided Media - Unguided Media – Transmission impairment – Performance. Error Detection and Error Correction: types of errors – detection – VRC – LRC – CRC – checksum – error correction.

[15 hrs]

Unit - III

Multiplexing : FDM – WDM – TDM . LAN : Ethernet - Token Bus - Token Ring – FDDI. SWITCHING : Circuit Switching - Packet Switching - Message switching. [15hrs]

Unit - IV

ISDN : History – Subscriber Access to ISDN - ISDN Layers - Broadband ISDN. ATM: Design goals - ATM Architecture – Switching - ATM layers. [15 hrs]

Unit - V

Networking and internetworking devices : Repeaters - Bridges - Routers - Gateway - Routing algorithms. TCP/IP: overview – Network layer – addressing – sub netting – other protocols in the network layer – transport layer – Domain name system – TELNET- FTP – TFTP – SMTP - SNMP – HTTP - World Wide Web. [15 hrs]

Recommended Text Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Introduction to Data Communication and Networking	Behrouz and Forouzan	2 nd Edition, TMH	2001

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Communication Networks (A first Course)	Jean Wairand	Second Edition, WCB/McGraw Hill	1998

E-Learning Resources:

1	https:// www.networktutorials.info
2	https://www.intelligentedu.com
3	https://www.webopedia.com

Course Outcomes:

CO No.	CO Statement
CO 1	Compare and contrast LAN and WAN in terms of Characteristics and functionalities
CO 2	Discuss the differences between cyclic redundancy check and checksum in terms of performance and implementation
CO 3	Discuss the features and functions of multiplexing and switching
CO 4	Explain the role of ATM and ISDN Layers in architecture
CO 5	Identify various types of internetworking devices and their features

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	2	2	3	2	3	1
CO 2	1	3	3	2	3	3
CO 3	3	3	3	1	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	2.4	2.8	3	2.2	3	2.6

Key : Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1,

No Correlation – 0

Teaching Methodology:

Lecture by chalk and talk, OHP, e-content, Group Discussion, Assignment, Quiz, LCD, Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Time
K1	A – 10 x 2 Marks	50	20	100	3 Hrs
K1 , K3	B – 5/7 x 8 Marks	250	40		
K2 , K3	C – 2/4 x 20 Marks	500	40		

SEMESTER-VI

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/6C/CCT	Computing Technologies	4	5 hrs	75 hrs	3	2	-	40	60	100

Course Objective:

To enable the students to

1. Gain knowledge in server, network and storage virtualization.
2. Compare the advantages and disadvantages of various cloud computing platforms.
3. Describe the basic concepts of mobile telecommunication systems.
4. Classify the network protocols.
5. Gain knowledge about Satellite systems and its application.

Course Outline:

Unit I:

Defining Cloud Computing – Cloud Types – The NIST model – The Cloud cube model – Deployment model – Service models –Examining the Characteristics of Cloud Computing: Paradigm Shift – Benefits of cloud computing – Disadvantages of cloud computing – Assessing the Value Proposition : The laws of cloudonomics – Cloud computing obstacles- Measuring cloud computing costs. (15 Hrs)

Unit II:

Understanding Services and Applications by Type: Defining Infrastructure as a Service (IaaS) – Defining Platform as a Service (Paas) – Defining Software as a Service (SaaS) – Defining Identity as a Service (IDaaS) - Defining Compliance as a Service (CaaS). (15 Hrs)

Unit – III

Introduction – Wireless transmission – frequencies for radio transmission – Multiplexing – Spread Spectrum - Cellular systems (15Hrs)

Unit – IV

Medium Access Control – Space division multiple access – Frequency division multiple access – Time division multiple access – Code division multiple access – Telecommunication Systems – GSM. (15 Hrs)

Unit – V

Satellite systems – History – applications – Basics – GEO-LEO-MEO - Routing – Localization - Handover (15 Hrs)

Recommended Text Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1.	Cloud Computing Bible	Barrie Sosinsky	Wiley India	2012
2.	Mobile Communications	Jochen Schiller	2nd ed., Pearson Education	2003

Reference Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1.	Cloud Computing : Web-Based Applications That Change the Way You Work and Collaborate Online	Michael Miller	Pearson Publications	2008
2.	AWS for Dummies	Bernard Golden	John Wiley & Sons Inc.,	2013
3.	Principles of Mobile Computing	Uwe Hansmann, Lothar Merk, Martin S.Nicklons and Thomas Stober	Springer International	2007

E-Learning Resources:

S.No.	URL
1	https://www.tutorialspoint.com/cloud_computing
2	https://www.tutorialspoint.com/mobile_computing

Course Outcome:

CO No.	CO Statement
1	Describe the concept of virtualization and its management.
2	Identify the architecture, infrastructure and delivery models of cloud computing
3	Illustrate the application of telecommunication systems in wireless networks.
4	Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network.
5	An ability to understand and explain the basics of Satellite Systems.

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	3	1
CO2	3	3	3	3	3	3
CO3	3	3	3	1	3	1
CO4	3	3	3	3	3	3
CO5	3	3	3	1	3	1
Average	3	2.8	3	2	3	1.8

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			
K2,K3	C - 2/4 X 20	500	40			

SEMESTER VI

Course Code	Course Name	Credits	Hours Per Week	Total Hrs	L	T	P	CA	SE	Total
CA18/6C/CMM	Multimedia	4	5	75 hrs (Theory)	3	2	-	40	60	100

Course Objectives:

To enable the students

1. To study how to work with the Photoshop workspace and to navigate, resize & crop images.
2. To read various retouching and repairing techniques to correct images and also use layer masks, filters & blending modes.
3. To inculcate knowledge to understand the environment of flash.
4. To learn how to use the basic drawing tools, selection tools and color filling tools.
5. To learn the basic methods of flash animation and Action Script.

Course Outline:

Unit – I:

PhotoShop : Photoshop's Environment - Raster and Vector Graphics – File Formats -Various pros, cons, and uses of common file formats - How to open and close files -Pasting images – Basic photo editing tasks: Zooming, Cropping and Straightening, file size reduction, Removing a background and Changing the contrast on part of a picture Sizing images – Working in different Color Modes – Choosing Colors.
[15 hours]

Unit – II:

Image Manipulation in Photoshop : Selecting Image Areas: using Quick selection tool, Magic Wand tool, Shape tools and Lasso tools. – Working with Layers – The Layer Menu and the Layers Panel Menu - Merging and Flattening layers - The Clone Stamp Tool - Modifying Selections Blending and Compositing - Painting Tools · Brightness/Contrast - Red-eye removal and fixing - Hue/Saturation.
[15 hours]

Unit – III:

Flash Basics: The Tools Panel, The Document Window and The Timeline Window - Saving & Uploading Files – Working with Symbols.
[15 hours]

Unit – IV:

Basic Drawing Tools – Shape Tools – Pen Tool – Selection Tools - Paint Bucket Tool: fills enclosed areas with colors or gradients – Working with Special Layer Types: Guides and Masks.
[15 hours]

Unit - V:

Animation with Flash and Publishing: Basic methods of Flash Animation - Introduction to scripting: Actions and Event Handlers - Publishing your Flash Movies - Publish settings – Publish preview and Publish commands. [15 hours]

Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Adode Flash Professional CS5 Bible	Todd Perkins	Wiley India	2011
2.	Adobe Photoshop cs5 bible	Lisa DaNae Dayly and Brad Dayley	Wiley India	2011

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	Adobe flash catalyst cs5 bible	Huddleston	Wiley	2010
2.	Adobe Photoshop 6.0 classroom in a book	Andrew Faulkner	Wiley	2018

E-Learning Resources:

1	http:// www.khulsey.com
2	https:// www.w3schools.com
3	https://www.tutorialized.com

Course Outcomes:

CO No.	CO Statement
CO 1	Gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the tool bar, layers, and the adjustments panel.
CO 2	Able to perform the various tools for image manipulation in Photoshop.
CO 3	Utilize various flash tools to design the environment to implement the animation.
CO 4	Demonstrate the ability to effectively utilize the timeline and motion-tween affects to produce animation.
CO 5	Utilize Action Script to produce an interactive animation.

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	2	2	2	2	2
CO 2	3	3	3	3	3	3
CO 3	2	2	2	2	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
AVERAGE	2.6	2.6	2.6	2.6	2.6	2.6

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlated - 0

Teaching Methodology:

Lecture (Chalk and Talk), Problem Solving, E-Content, Peer Learning, Group Discussion, Assignment, Quiz, Seminar.

Question Paper Pattern:

Knowledge Level	Section	Word Limit	Marks	Total	Time
K1	A – 10 x 2 Marks	50	20	100	3HRS
K1,K2	B – 5/7 x 8 Marks	250	40		
K2,K3	C – 2/4 x 20 Marks	500	40		

SEMESTER VI

Course Code	Course Name	Credits	Hours /Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/6E/IOT	Elective II : Internet of Things	4	5	75	3	2	-	40	60	100

Course Objectives:

To enable the students

1. To explain the definition and usage of the term “Internet of Things” in different contexts.
2. To understand the various network protocols used in IOT.
3. To understand the concepts of prototyping and to design an IOT to work using cloud computing architecture.
4. To inculcate the knowledge about IOT systems made up of sensors and wireless networks.
5. To learn the Physical design and applications of IOT.

Course Outline:

Unit I:

The Internet of Things: An Overview -The Flavour of the Internet of Things -The “Internet” Of “Things” -The Technology of the Internet of Things -Enchanted Objects -Who is making the Internet of Things? Design Principles for Connected Devices -Calm and Ambient Technology -Magic as Metaphor -Privacy -Keeping Secrets -Who’s Data Is It Anyway? -Web Thinking for Connected Devices -Small Pieces, Loosely Joined -First-Class Citizens on the Internet -Graceful Degradation Affordances
[15 Hrs]

Unit II:

Internet Principles -Internet Communications: An Overview –IP-TCP -The IP Protocol Suite (TCP/IP) - UDP -IP Addresses -DNS -Static IP Address Assignment -Dynamic IP Address Assignment -IPv6 MAC Addresses -TCP and UDP Ports -An Example: HTTP Ports -Other Common Ports - Application Layer Protocols -HTTP -HTTPS:Encrypted HTTP -Other Application Layer Protocols
[15 Hrs]

Unit III:

Thinking about Prototyping: Sketching -Familiarity -Costs versus Ease of Prototyping - Prototypes and Production -Changing Embedded Platform -Physical Prototypes and Mass Personalization -Climbing into the Cloud -Open Source versus Closed Source -Why Closed? -Why Open? -Mixing Open and Closed Source -Closed Source for Mass Market Projects -Tapping into the Community. [15 Hrs]

Unit IV:

Prototyping Embedded Devices: Electronics -Sensors -Actuators -Scaling Up the Electronics -Embedded Computing Basics -Microcontrollers -System-on-Chips -Choosing Your Platform -Arduino – Developing on the Arduino -Some Notes on the Hardware -Openness -Raspberry Pi - Cases and Extension Boards -Developing on the Raspberry Pi -Some Notes on the Hardware –Openness. [15 Hrs]

Unit V:

Prototyping the Physical Design: Preparation -Sketch, Iterate, and Explore -Nondigital Methods - Laser Cutting -Choosing a Laser Cutter -Software -Hinges and Joints -3D Printing -Types of 3D Printing -Software -CNC Milling -Repurposing/Recycling [15 Hrs]

Recommended Textbook:

S.No.	Title of the Book	Authors	Publishers	Year of Publications
1.	Designing the Internet of Things	Adrian McEwen and Hakim Cassimally	John Wiley and Sons	2014 Edition

Reference Books:

S.No.	Title of the Book	Authors	Publishers	Year of Publications
1.	Internet of Things: A Hands on Approach	Arshdeep Bahga, Vijay Madiseti	Tata McGraw Hill Publications	Third Edition, 1998
2.	Internet of Things with the Arduino Yun	Marco Schwartz	Packt Publishing	2014

3.	Raspberry Pi with Java: Programming the Internet of Things	James Weaver, Stephen Chin	McGraw-Hill	2015
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E-Learning Resources:

1	https://www.guru99.com/iot-tutorial.html
2	https://www.javatpoint.com/iot-tutorial
3	https://www.edureka.co/blog/iot-tutorial/

Course Outcomes:

CO No.	CO Statement
1	Apply the concepts of IOT.
2	Analyze and evaluate protocol used in IOT.
3	Able to design the IOT based on cloud computing infrastructure.
4	Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software
5	Understand the physical design of IOT and apply IOT to different Applications. .

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Peer Learning, Assignment.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word Limit	Marks	Total	Time	Special instructions if any
K1	A – 10 x 2	50	20	100	3 Hrs.	-
K1,K3	B – 5/8 x 8	250	40			
K2,K3	C – 2/4 x 20	500	40			

SEMESTER-VI

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/6E/CCS	Elective II : Cyber Security	4	5 hrs	75 hrs	3	2	-	40	60	100

Course Objective:

To enable the students to

1. Explain the concepts of privacy and information security in today's environment.
2. Analyse how application security such as database, email and firewall is increasingly interconnected with issue of security.
3. Gain knowledge on how the security threats are affecting society and e-commerce.
4. Gain basic idea about developing secure information systems.
5. Describe the role of cyber security policies and laws.

Course Outline:

Unit I:

Introduction to information systems - Development of Information Systems - Introduction to information security - Information Assurance - Cyber Security - Security Risk Analysis. (15 Hrs)

Unit II:

Application Security : Introduction to the application security – Security testing for applications – Data Security – Database Security – Introduction to Email Security – Internet Security – Network Security Policy – Security Technologies : Firewalls – Virtual Private Networks. (CaaS). (15 Hrs)

Unit – III:

Security Threats : Virus Attacks – E-mail Viruses – Worms – Trojan – Logic Bomb – Phishing and Spoofing Attacks – Malware – Denial of Service – Security Threats to E-Commerce : Electronic Payment System – Credit Card – Debit Card – Digital Signature. (15 Hrs)

Unit – IV:

Developing Secure Information Systems: Security at various Phases of Information system development – Physical Security of Information Assets – Application development Security - Information Security Governance - Risk Management - Security Architecture and Design. (15 Hrs)

Unit – V:

Security Issues in Downloadable Devices - Physical Security of IT Assets –Information Security - CCTV and intrusion Detection Systems - Backup Security Measures –Need for Security Policies – WWW Policy – Email Security Policy- Cyber Crime and Cyber Laws. (15 Hrs)

Recommended Text Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1.	Cyber Security	Avantika Yadav	Narosa	2017

Reference Books:

S.no	Title of the book	Authors	Publishers / Edition	Year of publications
1.	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole and Sunit Belpure	Wiley	2011
2.	The Complete Reference – Network Security	Roberta Bragg, Mark Rhodes-Ousley	McGraw-Hill	2017

E-Learning Resources:

S.No.	URL
1	https://www.javatpoint.com/cyber-security-tutorial
2	https://www.tutorialspoint.com/ethical_hacking_and_cyber_security/index.asp

Course Outcome:

CO No.	CO Statement
1	Analyze about the information security and risk analysis.
2	Identify the threats, attacks, vulnerabilities and countermeasures in various applications.
3	Illustrate the concept of various security threats in E-commerce.
4	Develop secure information system in various phases of information system development.
5	Describe about the information security laws and policies.

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	3	3	1
CO2	2	3	3	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	3
CO5	1	2	2	1	3	1
Average	2.4	2.6	2.8	2.6	3	1.8

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Chalk and Talk, OHP, LCD, Seminar, Discussion, Quiz, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Word limit	Marks	Total	Time	Special instructions if any
K1	A - 10 X 2	50	20	100	3 Hrs.	-
K1,K3	B - 5/7 X 8	250	40			
K2,K3	C - 2/4 X 20	500	40			

SEMESTER VI

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/6C/PO2	Internship and Mini Project	4	5	75hrs Lab.	0	0	5	40	60	100

Course Objectives:

To enable the students

6. To give exposure about software industry.
7. To develop interpersonal and communication skills.
8. To make the students to develop critical thinking and problem solving skills.
9. To get knowledge about document preparation.
10. To develop software projects.

Course Outline:

Internship : At the end of fourth semester students should go on an internship (group/individual) to any software developing company/Institution/Organization and document their experience. The same should be presented for viva-voce.

Project : Any Computer related software has to be developed and presented for viva-voce at the end of the semester.

Course Outcomes:

CO No.	CO Statement
CO 1	Identify , select and learn about a specific domain
CO 2	Analyze, design and implement algorithms
CO 3	Interpret results using Statistical measures

Mapping of Course Outcome with Programme Specific Outcome:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key : Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, No Correlation – 0

Viva –Voce :

Knowledge Level	Marks	Total
K2,K3,K4,K5,K6	60 (for Mini Project)	60

SEMESTER VI

Course Code	Course Name	Credits	Hours per week	Total hrs	L	T	P	CA	SE	Total
CA18/6C/PR8	Multimedia Laboratory	3	5	75 hrs (Practical)	0	0	5	40	60	100

Course Objectives:

To enable the students

- 1.To use basic selection tools, edit parts of an image and manipulate layers through positioning, scaling & rotation.
- 2.To evaluate and correct image imperfections.
- 3.To inculcate knowledge to understand the environment of flash.
- 4.To use the basic drawing tools, selection tools, text box and color filling tools.
- 5.To manipulate the methods of flash animation and Action Script.

Course outline:

Photoshop :

1. Create CD cover.
2. Create text and display in various format.(Shadow , Emboss effects)
3. Convert a color picture to black & white image.
4. Modify a picture using selection tools.
5. Given a picture of a flower with a background. Extract the flower and organize on a different background.
- 6.Given a picture. Adjust the brightness and contrast of the picture to give a better look.
7. Display the given picture through your name using mask.

Flash :

8. Create a motion tween and shape tween.
9. Create an animation to represent a growing moon using frame by frame animation
10. Create an animation to bounce a ball on steps.
11. Simulate movement of a cloud.
12. Draw the blades of a fan and make it work by giving proper animate.
13. Create a guided motion tween.
14. Create a spinning oval.
15. Create a flash application to scroll text with in a text box.
16. Create a fade in , fade out object using flash.
17. Create a zoom animation and ripple effect.

18. Mask a photo
19. Create a button using flash.
20. Create an Action script to execute for a event in a Flash application.

Course Outcomes:

CO No.	CO Statement
CO 1	Design layouts for web pages, pages adverts, brochures, cd covers, Package designing.
CO 2	Able to repairs the photo using different tools in photoshop.
CO 3	Create a motion tween, guided motion tween and shape tween.
CO 4	Create a flash application to scroll text with in a text box, button and ripple effect.
CO 5	Design, create, edit and manipulates animation using several animation tools and techniques

Mapping of Course Outcome with Programme Specific Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
AVERAGE	3	3	3	3	3	3

Key: Strongly Correlated – 3, Moderately Correlated – 2, Weakly Correlated – 1, Correlated - 0

No

Teaching Methodology:

Practical demonstrations, Discussion, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A – 2 x 30 Marks	60	60	3Hours

SEMESTER –I

Course Code	Course Name	Credits	Hrs/ Week	Total Hrs	L	T	P	CA	SE	Total
CA18/1N/COA	Non – Major Elective : Office Automation	2	2	30	0	0	2	-	50	50

Course Objectives:

To enable the students

1. To make the students gain typing knowledge
2. To make the students create and print letters and documents.
3. To make the student develop power point presentations.

Course Outline:

Unit – I

Ms-Word

Introduction - File menu – Cut, Copy and Moving text – Find and Replace - Formatting the document (Font, Paragraph, Bullets & Numbering) - Inserting Page breaks – Page Numbers – Pictures – Header & Footer - Creating Tables. **(10 hrs)**

Unit – II

Ms-Excel

Introduction – Managing Workbooks –Editing data - Formatting Cells – Insert Row, Column
Creating a table for Payroll program using formulas – Conditional Formatting - Aligning text & Numbers - Simple Charting - Chart Wizard – Sort Records – Filter. **(10 hrs)**

Unit-III

Ms-PowerPoint

Introduction - Create a new presentation using Blank presentation, using Templates, using Auto Content Wizard – Apply Custom animation, Slide Transition - apply Rehearse Timing –Setup Show **(10 hrs)**

Recommended Text Books:

S. No	Title of the Book	Authors	Publishers	Year of Publication
1	Computer Applications in Business and Management	AnanthiSheshasaayee and Sheshasaayee	Margham Publications,7 th Edition	2009

E - Learning Resources:

S. No	URL
1	http://www.laynetworks.com/cs01.htm
2	http://computerfundamentals.org/

Course Outcomes:

CO No.	CO Statement
CO 1	Create and print letters and documents
CO 2	Create and analyze tables and charts
CO 3	Create and apply animations

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
AVERAGE	3	3	3	3	3	3

Teaching Methodology:

Practical Demonstrations, Discussion, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Marks	Total	Time
K2, K3, K4, K5, K6	A – 2 X 25	50	50	2 Hours

SEMESTER-II

Course Code	Course Name	Credits	Hours/Wk	Total hrs.	L	T	P	CA	SE	Total
CA18/2N/WWH	Non - Major Elective : World Wide Web Design with HTML	2	2 hrs	30 hrs	0	0	2	-	50	50

Course Objective:

To enable the students to

1. Outline the basic internet concepts.
2. Build web pages using HTML commands.
3. Build a web page using Frames and Forms.

Course Outline:

Unit I:

Introduction to the internet – Internet technologies - Internet browsers - Introduction to HTML – Head and body sections – Designing the body section. (10 hrs)

Unit II:

Ordered and Unordered lists – table handling – DHTML and style sheets. (10 hrs)

Unit III:

Frames – A web page design Project – Forms. (10hrs)

Recommended Text Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1.	World Wide Web Design with HTML	C. Xavier	Tata McGraw Hill	2010
2.	A complete guide to internet and web programming	Deven N.Shah	Dreamtech Press	2009

E-Learning Resources:

1	www.w3schools.com
2	www.tutorialspoint.com/html/index.html
3	www.simplehtmlguide.com

Course Outcomes:

CO No.	CO Statement
1	Describe the basic concepts of Internet programming and protocols used.
2	Create applications using HTML commands.
3	Develop applications using HTML Frames and Forms.

Mapping of Course Outcome with Programme Specific Outcome:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
Average	3	3	3	3	3	3

Key : Strongly Correlated – 3, Moderately Correlated – 2 , Weakly Correlated – 1, No Correlation – 0.

Teaching Methodology:

Practical demonstrations, Discussion, Program writing.

Question Paper Pattern:

Knowledge Level	Section/Mark	Marks	Total	Time
K2,K3,K4,K5,K6	A - 2 X 30	60	60	3 Hours

SEMESTER V

Course Code	Course Name	Credits	Marks
CA18/5SS/CSD	Case Study using Data Mining	2	100

Course Objectives:

To enable the students

1. To recognize the strengths and limitations in the field of data mining.
2. To create an opportunity to work with real life applications.
3. To develop the ability to make an analysis of the problem and find the correct solutions.

Course Outline:

Case study areas:

1. E-Commerce
2. Inventory
3. Banking
4. Health Care
5. Astronomy
6. Cyber Crime
7. Food industry
8. Tele-Communication
9. Agriculture
10. Social Issues

Any one of the above area should be chosen for case study. At the end of the semester documentation with data analysis should be presented for Viva-voce.

Question Paper Pattern:

Practical	Marks
Documentation and Viva-Voce	100