Dwaraka Doss Goverdhan Doss Vaishnav college (Autonomous)
Re-accredited at 'A' Grade by NAAC

DEGREE OF BACHELOR OF COMPUTER APPLICATIONS (B.C.A.)

Choice Based Credit System

REGULATIONS
(Effective from the academic year 2018-2019 onwards)

1. Eligibility for admission:

Candidates for admission to the first year of the Degree of Bachelor of Computer Applications course shall be required a pass in the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereof by the Syndicate of the University of Madras.

2. Eligibility for the award of degree:

A candidate shall be eligible for the award of the Degree only if he /she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years, passed the examinations all the Six-Semesters prescribed earning 140 (120 are meant for Langauage-1, Language-2, Allied, Major and 20 credits for other activities like Non-Major Elective, Soft Skills, Environmental Studies, Value Education, Extension activities etc.,)

3. Duration:

a) Each academic year shall be 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 semester respectively.

b) 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 be not less than 90 working days for each semester.

4. Course of study:

The main Subject of Study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL/HINDI/FRENCH/SANSKRIT/TELUGU

PART – II ENGLISH

PART – III CORE SUBJECTS
ALLIED SUBJECTS
PROJECT/ELECTIVES WITH THREE COURSES

PART – IV

1. NON-MAJOR ELECTIVE

   (a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I, shall take Tamil comprising of two course (level will be at 6th Standard).

   (b) Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I, shall take Elective subject offered by the home department comprising of two courses (or) Advanced Tamil.

2. SKILL BASED SUBJECTS - SOFT SKILLS

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

5. Extension activities:

A candidate shall be awarded a maximum of 1 Credit for Compulsory Extension Service.

All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Rotract/ Youth Red cross or any other service organizations in the college and shall have to put in Compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in one year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in two Years will get ONE CREDIT.

Literacy and population education field work shall be a compulsory component in the above extension service activities.

6. Scheme of examination:

Scheme of Examination shall be given in APPENDIX – C

Model Marks' Distribution Framework

Subject Name	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
			External	Internal	Total	
PART-I Language		3	60	40	100	
PART-II English		3	60	40	100	
PART-III Core subject		3	60	40	100	
Core Subject :Practical		3	60	40	100	
Allied Subject		3	60	40	100	
PART – IV **1. NON- MAJOR ELECTIVE** a) Those who have studied Tamil up to XII Std. under Part-I shall take courses comprising of aptitude and management skills or Advanced Tamil comprising of two courses. b) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard).		3	60	40	100	
2. **Skill based subjects – Soft Skills***		3	50	50	100	30

*Syllabus framed and approved by English Department

The following procedure is followed for Internal Marks:

Criteria	Marks Awarded
Test (2 out of 3)	10
Attendance	5
Seminars	5
Assignments	5
Classroom Activity/Interaction/General Behavior	5
Other Curricular Activities	3
Model Exam	7
Total Marks	40

Breakup of Attendance Percentage (5 Marks)

Range of Attendance	Marks Awarded
Less than 30%	00
31%< 50%	01
51%< 64%	02
65% to 74%	03
75% to 80%	04
81% to 100%	05

Practical Paper Internal (40 Marks)

Criteria	Marks Awarded
Attendance	05
Practical Test (Best 2 out of 3)	25
Record	10
Total Marks	**40**

7. Requirements for proceeding to Subsequent Semester:

i. Candidates shall register their names for the First Semester Examination after the admission in UG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along the current (subsequent) semester subjects.

iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council of the college from time to time.

Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the Course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

8. Passing minimum:

A candidate shall be declared PASS based on the following,

a) There shall be no Passing Minimum for Internal.

b) For External Examination, Passing Minimum shall be of 40% (Forty Percentage) of the maximum marks prescribed for the paper for each Theory paper/Practical/Project and Viva-voce.

c) In the aggregate (External + Internal) the passing minimum shall be of 40%.

d) She/ He shall be declared to have passed the whole examination, if she/he passes in all the papers and practical wherever prescribed/as per the scheme of examinations by earning 140 CREDITS in Parts-I, II, III, IV & V. She/he shall also fulfill the extension activities prescribed earning a minimum of 1 credit to qualify for the Degree.

9. Classification of Successful Candidates:

PART- I: TAMIL / OTHER LANGUAGES (French, Sanskrit, Hindi and Telugu)

TAMIL/OTHER LANGUAGES: Successful candidates passing the Examinations for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART – II: ENGLISH

ENGLISH: Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

PART – III: CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVE with three options:

Successful candidates passing the examinations for Core Courses together and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core courses together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the Third Class.

PART – IV (consisting of sub items 1 (a), (b) & (c), 2, 3 and 4) as furnished in the Regulations 4 Part-IV supra.

PART – V: EXTENSION ACTIVITIES:

Successful candidates earning of 1 credit SHALL NOT BE taken into consideration for Classification/Ranking/ Distinction.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking/ Distinction.

Candidates who pass all the examinations prescribed for the Course with a break in the First Appearance due to the reasons as furnished in the Regulations 7 (iii) supra are only eligible for classification.

11. Transitory provision:

Candidates who have undergone the course of study prior to the academic year 2008 – 2009 will be permitted to appear for the examinations under those Regulations for a period of

TWO years i.e. up to and inclusive of April/May 2012 Examinations. Thereafter, they will permit to appear for the examination only under the Regulations then in force.

QUESTION PAPER PATTERN FOR THEORY

Duration: 3 hours **Max Marks: 100**

Part – A

FIVE out of EIGHT questions. (5 x 5 = 25 Marks)

At least **ONE** question from each unit and **not more than two questions** from each unit.

Part –B

FIVE questions (Internal Choice) (5 x 15 = 75 Marks)

ONE question from each unit. (Either or type).

QUESTION PAPER PATTERN FOR PRACTICALS

Duration: 3 hours **Max Marks: 60**

The **Examiner** will prepare a question paper with the help of the Question Bank supplied by the Controller's office.

FIRST SEMESTER

S.No.	Subjects	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
				External	Internal	Total	
1.	**PART I** Language Paper I	3	3	60	40	100	4
2.	**PART II** English Paper I	3	3	60	40	100	4
3.	**PART III** Core Paper I: **Fundamentals of Digital Electronics**	4	3	60	40	100	5
4.	**PART III** Core Paper II: **Problem Solving Techniques**	4	3	60	40	100	4
5.	**PART III** Core Practical I: **Digital Electronics Lab**	3	3	60	40	100	3
6.	**Allied Paper I** Mathematical Foundation I *	3	3	60	40	100	6
7.	**PART IV** **1. NON-MAJOR ELECTIVE I** a) Those who have studied Tamil up to XII Std. shall take **Contemporary Management Skills** or Advanced Tamil. b) Those who have not studied Tamil up to XII Std. shall take Tamil (Level will be at 6thstandard)	2	3	60	40	100	2
8.	**2. Soft Skills I****	2	3	50	50	100	2
Total		**24**					**30**

*Syllabus framed and approved by Mathematics Department
**Syllabus framed and approved by English Department

SECOND SEMESTER

S.No.	Subjects	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
				External	Internal	Total	
1.	**PART I** Language Paper II	3	3	60	40	100	4
2.	**PART II** English Paper II	3	3	60	40	100	4
3.	**PART III** Core Paper III: **C++ Programming**	4	3	60	40	100	5
4.	**PART III** Core Paper IV: **Microprocessor and its Applications**	4	3	60	40	100	4
5.	**PART III** Core Practical II : **C++ Programming Lab**	3	3	60	40	100	3
6.	**Allied Paper II** Mathematical Foundation II*	3	3	60	40	100	6
7.	**PART IV** **1. NON-MAJOR ELECTIVE II** a) Those who have studied Tamil up to XII Std. shall take **Logical and Analytical Reasoning** or Advanced Tamil. b) Those who have not studied Tamil up to XII Std. shall take Tamil (level will be at 6th standard)	2	3	60	40	100	2
8.	**2. Soft Skills II****	2	3	50	50	100	2
Total		**24**					**30**

*Syllabus framed and approved by Mathematics Department
**Syllabus framed and approved by English Department

THIRD SEMESTER

S.No.	Subjects	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
				External	Internal	Total	
1.	**PART III** Core Paper V: **Java Programming**	4	3	60	40	100	5
2.	**PART III** Core Paper VI: **Data Structures**	4	3	60	40	100	5
3.	**PART III** Core Paper VII: **Graphics and Multimedia**	4	3	60	40	100	4
4.	**PART III** Core Practical III: **Java Programming Lab**	3	3	60	40	100	4
5.	**PART III** Core Practical IV: **Data Structures Lab**	3	3	60	40	100	4
6.	**Allied Paper III** Financial Accounting*	3	3	60	40	100	6
7.	**PART IV** **Soft Skills III****	2	3	50	50	100	2
Total		**23**					**30**

*Syllabus framed and approved by Commerce Department
**Syllabus framed and approved by English Department

FOURTH SEMESTER

S.No.	Subjects	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
				External	Internal	Total	
1.	**PART III** Core Paper VIII: **Python Programming**	4	3	60	40	100	5
2.	**PART III** Core Paper IX: **Operating Systems**	4	3	60	40	100	5
3.	**PART III** Core Paper X: **Software Engineering**	4	3	60	40	100	4
4.	**PART III** Core Practical V: **Python Programming Lab**	3	3	60	40	100	4
5.	**PART III** Core Practical VI: **Operating System and Shell Programming Lab**	3	3	60	40	100	3
6.	**Allied Paper IV** Cost and Management Accounting*	3	3	60	40	100	6
7.	**PART IV** **Soft Skills IV****	2	3	50	50	100	2
8.	**PART IV** Environmental Studies	2	3	60	40	100	1
Total		**25**					**30**

*Syllabus framed and approved by Commerce Department
**Syllabus framed and approved by English Department

FIFTH SEMESTER

S.No.	Subjects	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
				External	Internal	Total	
1.	**PART III** Core Paper XI: **Dot Net Programming**	4	3	60	40	100	5
2.	**PART III** Core Paper XII: **Database Management Systems**	4	3	60	40	100	5
3.	**PART III** Core Paper XIII: **Computer Networks**	4	3	60	40	100	5
4.	**PART III** Paper XIV Elective 1: **Data Mining (or) Artificial Intelligence and Expert Systems (or) Object Oriented Analysis and Design**	4	3	60	40	100	5
5.	**PART III** Core Practical VII: **Dot Net Programming Lab**	3	3	60	40	100	5
6.	**PART III** Core Practical VIII: **RDBMS Lab using ORACLE**	3	3	60	40	100	5
7.	**PART IV** Value Education	1	3	60	40	100	-
	Total	**23**					**30**

SIXTH SEMESTER

S.No.	Subjects	Credits	Exam Duration	Maximum Marks			Lecture Hours per Week
				External	Internal	Total	
1.	**PART III** Core Paper XV: **PHP Programming**	4	3	60	40	100	5
2.	**PART III** Core Paper XVI: **Mobile Application Development**	4	3	60	40	100	5
3.	**PART III** Core Paper XVII: **Design and Analysis of Algorithms**	4	3	60	40	100	5
4.	**PART III** Paper XVIII Elective 2 : **Operations Research (or)** **E-Commerce (or) Cryptography**	4	3	60	40	100	5
5.	**PART III** Core Practical IX: **PHP Programming Lab**	3	3	60	40	100	5
6.	**PART III** Core Practical X: **Mobile Application Development Lab**	3	3	60	40	100	5
7.	**PART IV** Extension Activities	1	3			100	-
	Total	**23**					**30**

FIRST SEMESTER

CORE PAPER I - FUNDAMENTALS OF DIGITAL ELECTRONICS

UNIT I: Digital Computers and Digital Systems. **Number Systems & Codes:** Number System - Base Conversion - Binary Codes - Code Conversion. **Digital Logic**: Logic Gates - Truth Tables - Universal Gates.

UNIT II: Boolean algebra: Laws & Theorems - SOP, POS Methods - Simplification of Boolean Functions using theorems – Simplification of Boolean Functions using K-Map (Two, Three and Four variables).

UNIT III: Binary Arithmetic: Binary Addition –Binary Subtraction - Arithmetic Building Blocks. **Adders**: Half Adder and Full Adder. **Subtractors**: Half Subtractor and Full Subtractor. **Combinational Logic**: Multiplexers - Demultiplexers - Decoders – Encoders.

UNIT IV: Sequential Logic: RS, JK, D and T Flip-Flops. **Registers**: Shift Registers - Types of Shift Registers – Implementation of Serial-In Serial-Out Shift Register and Serial-In Parallel-Out Shift Register.

UNIT V: Counters: Asynchronous Counters Ripple, Mod, Up-Down Counters- Synchronous Counters - Types of ROM and RAM.

TEXT BOOK:

1. **V.Rajaraman and T.Radhakrishnan**, "*Digital Computer Design"*, Fifth Edition, 2012, Prentice Hall of India.

REFERENCE BOOKS:

1. **D.P.Leach and A.P.Malvino**, *"Digital Principles and Applications"*, Seventh Edition, 2011,TMH.
2. **T.C.Bartee**, "*Digital Computer Fundamentals"*, Sixth Edition, Tata McGraw Hill.
3. **Floyd and Jain**, "*Digital Fundamentals*", Ninth Edition, Pearson Education.

E-REFERENCES:

1. http://nptel.iitm.ac.in/video.php?subjectId=117106086
2. http://nptel.iitm.ac.in/Onlinecourses/Srinivasan/

FIRST SEMESTER

CORE PAPER II - PROBLEM SOLVING TECHNIQUES

UNIT I: Introduction: History, characteristics and limitations of Computer. **Hardware/Anatomy of Computer**: CPU, Memory, Secondary storage devices, Input Devices and Output devices. **Types of Computers**: PC, Workstation, Minicomputer, Main frame and Supercomputer. **Software**: System software and Application software. **Programming Languages**: Machine language, Assembly language, High-level language,4 GL and 5GL-Features of good programming language. **Translators**: Interpreters and Compilers.

UNIT II: **Data**: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).**Structured Programming**: **Algorithm**: Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts**: Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. **Pseudocode:** Writing a pseudocode. **Coding, documenting and testing a program**: Comment lines and types of errors. **Program design**: Modular Programming.

UNIT III: **Selection Structures:** Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures. **Repetition Structures**: Counter Controlled Loops –Nested Loops– Applications of Repetition Structures.

UNIT IV: **Data**: Numeric Data and Character Based Data. **Arrays**: One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.

UNIT V: Data Flow Diagrams: Definition, DFD symbols and types of DFDs. **Program Modules**: Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. **Files**: File Basics-Creating and reading a sequential file- Modifying Sequential Files.

TEXT BOOK:

1. **Stewart Venit**, "*Introduction to Programming: Concepts and Design*", Fourth Edition, 2010, Dream Tech Publishers.

E- REFERENCES:

1. http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
2. http://utubersity.com/?page_id=876

FIRST SEMESTER

CORE PRACTICAL I -DIGITAL ELECTRONICS LAB

1. Verification of Truth Table for AND, OR, NOT, NAND, NOR and EX-OR gates.
2. Realization of NOT, AND, OR, EX-OR gates using NAND gate.
3. Realization of NOT, AND, OR, EX-OR gates using NORgate.
4. Karnaugh Map Reduction and Logic Circuit Implementation.
5. Verification of De-Morgan's Law
6. Verification of Associative Law
7. Verification of Distributive Law
8. Implementation of Half-Adder and Full-Adder.
9. Implementation of Half-Subtractor and Full-Subtractor.
10. Four Bit Binary Adder
11. Four Bit Binary Subtractor
12. Decimal adder
13. Verification of Characteristic Table of various flip-flops
14. Design of Shift registers
15. Design of Counters

FIRST SEMESTER

NON MAJOR ELECTIVE I- CONTEMPORARY MANAGEMENT SKILLS

UNIT – I: Introduction: Definition of Personality -**Determinants of Personality**: Biological, Psychological and Socio-cultural factors-Misconceptions and Classifications - Need for personality development.

UNIT II: Self Awareness and Self Motivation: Self analysis through SWOT and Johari window- Elements of Motivation - Seven rules of Motivation - Techniques and Strategies for Self motivation -Motivation checklist and goal setting based on the principle of SMART -Self motivation and life-Importance of self-esteem and enhancement of Self-esteem.

UNIT III: Memory and Study Skills: Definition and importance of memory - Causes of Forgetting - How to Forget (thought stopping) -How to Remember (techniques for improving memory) -The technique of passing Exams –Management of Examination fear.

UNIT IV: Power of Positive Thinking: Nurturing creativity**,** Decision Making and Problem Solving-Thinking Power- Seven Steps for dealing with doubt -Traits of positive thinkers and high achievers - Goals and techniques for Positive Thinking – Enhancement of concentration through positive thinking-Practicing a positive Life Style.

UNIT V: General Knowledge and Current Affairs: Regional, National and International events - Geographical, Political and Historical facts - Information on Sports and other Recreational Activities -Basic Knowledge with regard to Health and Health Promotion.

TEXT BOOKS:

1. **Mile, D.J.,** "*Power of positive thinking*", Delhi, Rohan Book Company.
2. **Pravesh Kumar**, "*All about self motivation*", Goodwill Publishing House.
3. **Dudley, G.a** ,"*Double your learning power*", Delhi, Konark press, Thomas Publishuing Group Ltd.
4. **Lorayne, H.**, "*How to develop a super poser memory*", Delhi, Konark Press, Thomas Publishing Group Ltd.
5. **Hurlock, E.B.**,*"Personality Development"*, 28th Reprint, Tata McGraw Hill.

REFERENCE BOOKS:

1. **Shiv Khera**, "*You can Win*",2002, Macmillan India Ltd.,
2. **Steven.RCovey**, "*Seven Habits of Highly effective people*", 2001, Franklin Convey.

E-REFERENCE:

1. http://www.nptel.iitm.ac.in/courses/110105029/pdf%20sahany/Module.6-23.pdf

SECOND SEMESTER

CORE PAPER III- C++ PROGRAMMING

UNIT-I: Introduction to Object Technology: Object Oriented Programming Concepts–OOP Benefits and OOP applications. **Elementary C++ Programming**: Keywords- Variables- Constants/ Literals - Operators- Fundamental Data Types – Expressions-Input Statement – Output Statement – General Format of a C++ program – Arrays – Strings.

UNIT-II: Conditional/Decision Making Statements: if, if-else, else-if ladder, nested if and switch Statements. **Loop Statements**: while, do-while, for loop. **Jump Statements**: break, continue, goto statements.

UNIT-III: Library Functions in C++: Mathematical and String functions. **User-Defined Functions:** Function Prototyping – Function call - Parameters Passing methods. Inline Functions - Function Overloading. **Classes and Objects:** -Declaring class and objects- Member functions- Friend Functions-Passing object to function – Returning object from function.

UNIT – IV: Static Data member and Static member functions **–** Default Arguments**. Constructors:** Features of constructors – Types of Constructors**. Destructors:** Features of Destructor**. Operator Overloading**: Rules for Operator Overloading – Overloading of unary and binary operators using member function and friend function.

UNIT-V: Inheritance: Single Inheritance - Multilevel inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. **Polymorphism**: Rules for Virtual functions and pure virtual functions. Command Line Arguments.

TEXT BOOKS:

1. **E.Balaguruswamy**, *"Object Oriented Programming in C++"*, Sixth Edition, 2012, TMH.

REFERENCE BOOKS:

1. **H. Schildt**, *"The Complete Reference C++"*, Fourth Edition, 2017, TMH.
2. **Y. Kanetkar**, *"Let us C++"*,Third Edition, BPB Publishers.

E-REFERENCES:

1. http://en.highscore.de/cpp/boost/
2. http://bookboon.com/en/structural-programming-with-c-plus-plus-ebook

SECOND SEMESTER

CORE PAPER IV-MICROPROCESSOR AND ITS APPLICATIONS

UNITI: Introduction to Microprocessors – 8085 Programming Model- Instruction Formats - Addressing Modes - Microprocessor architecture and its operations. **8085 MPU**: Pinout and Signals-Functional Block Diagram.

UNIT II: 8085 Instruction Set and Classifications: Data Transfer Instructions – Arithmetic and Logic Instructions – Branching and Machine Control Instructions. **Programming Techniques**: Looping, Counting and Indexing–Writing Assembly Levels Programs.

UNIT III: Stack: Push and Pop. **Subroutine**: Call and RST. Restart, Conditional Call and Return Instructions. 8-bit, BCD, Multibyte Addition and Subtraction – 8-bit and BCD Multiplication –8-bit and BCD Division.

UNIT IV: Conversions: BCD to Binary and Binary to BCD conversions- ASCII to BCD and BCD to ASCII conversions –Binary to ASCII and ASCII to Binary conversions. **Counters and Time delays:** Time delays using one register, register pair and loop within loop.

UNIT V: 8085 Interrupts: EI, DI, TRAP, RST, SIM and RIM - Direct Memory Access (DMA) – Memory Interface, Memory Mapped I/O.

TEXT BOOK:

1. **Ramesh Gaonkar**, "*Microprocessor Architecture, Programming and Applications with 8085*", Sixth Edition, Penram International Publishing.

REFERENCE BOOK:

1. **Sunil Mathur**, "*Microprocessor 8085 and its Interfacing*", Second Edition, 2011, PHI.

E-REFERENCES:

1. www.engineerclub.in/.../8085-microprocessor-by-ramesh-s-gaonkar.html.
2. suman-bcanotes.blogspot.com/…/micro-processor-notes-bysuman-raj.html

SECOND SEMESTER

CORE PRACTICAL II- C++ PROGRAMMING LAB

Programs for

1. C++ Operators
2. Decision-making statements
3. Loop statements
4. Library functions
5. Inline function
6. Function overloading
7. Class and object
8. Passing object to function
9. Returning object from function
10. Constructor and Destructor
11. Static data members and member functions
12. Operator Overloading
13. Inheritance
14. Virtual function
15. Command Line Arguments

SECOND SEMESTER

NON MAJOR ELECTIVE II- LOGICAL AND ANALYTICAL REASONING

Unit-I: Questions relating to analogy test, classification, coding and de-coding, classification of ranks

Unit-II: Logic based Venn diagrams, Logical alphabet, number and time sequence test.

Unit-III: Logical arrangement of words, Blood relations, Letter series

Unit-IV: Questions relating to Completion of series, counting of figures

Unit-V: Embedded figure, Analogy, Classification of figures

TEXT BOOK:

1. **B.S.Sijwali, Indu Sijwali** – "*A New approach to reasoning, verbal and non-verbal*", Arihant Publications Pvt. Ltd.

E - REFERENCES:

1. indiabix.com
2. a2zinterviews.com
3. edugoog.com

THIRD SEMESTER

CORE PAPER V - JAVA PROGRAMMING

UNIT I: Introduction to Java - Features of Java – Java Environment - Lexical Issues or tokens- Data Types - Variables - Arrays - Operators – Conditional Statements-Iterative Statements-General Structure of a Java Program -Command Line Arguments.

UNIT II: Classes and Objects – Fields and Methods Declaration -Constructors – Method Overloading - Static keyword - Final keyword -String Class -String Buffer Class. **Java Utilities**: Scanner, Stack, Date, Vector, Enumeration, Random and String Tokenizer. **Inheritance**: Keyword extends-Types of Inheritance–Keyword super- Overriding of methods-Abstract class and methods.

UNIT III: User-Defined Packages: Naming conventions – Creating and accessing Packages. **Interface**: Defining Interface-Keyword implements -Multiple Inheritance using Interface. **Exception Handling**: Types of errors - Syntax of Exception handling code – Built-in Exceptions – Multiple catch statements – Nested try block – Finally statement- Throwing our own exception using throw – Method throwing exception using throws keyword. **Threads**: Introduction- Thread States or life cycle of thread- Creation of threads using Thread class and Runnable interface – Thread methods -Thread Priorities -Thread Synchronization.

UNIT IV: I/O Streams: Stream classes – Byte stream classes - Character stream classes - File Streams – Using File class – I/O Exceptions–Random access files.

UNIT V: Applets: Difference between applet and application -Applet life cycle - Building Applet code using Applet tag – Passing parameters to Applets- Drawing various shapes using Graphics Class. **AWT Controls**: Buttons, Labels, TextField, TextArea, Choice, CheckBox, List, ScrollBar and Layout Managers.

TEXT BOOKS:

1. **E.Balagurusamy**, "*Programming with Java*", Fifth Edition, 2014, Tata McGraw- Hill.

REFERENCE BOOKS:

1. **P Radha Krishna**, "*Object Oriented Programming through Java*", Second Edition, 2007, Universities Press.
2. **P. Naughton and H. Schildt**, "*Java2 (The Complete Reference)*", Ninth Edition, 2014, Tata McGraw-Hill.

E- REFERENCES:

1. www.tutorialspoint.com/java/java-quick-guide.htm
2. www.tutorialspoint.com/java/java_overview.htm

THIRD SEMESTER

CORE PAPER VI - DATA STRUCTURES

UNIT I: Data Structures: Definition and Classification. **Arrays**: Array Operations – Representation of Arrays – Applications of Arrays. **Stack**: Operations on Stacks -**Stack applications:** Infix to postfix notation and Evaluation of Postfix notation. **Queues**: Operations on the Queues - Circular queue – Dequeue - Priority queue - Applications of queue.

UNIT II: Introduction to the Linked List - Basic operations on linked list – Singly Linked Lists – Doubly Linked Lists – Circularly Linked Lists-Linked Stacks – Linked Queues. **Applications of Linked List**: Addition of Polynomials.

UNIT III: Trees: Basic Terminology - Binary Trees - Representation of Trees and Binary trees. **Binary Tree Traversals**: Inorder, Preorder and Postorder. **Binary Search Tree (BST):** Insertion and Deletion operations in BST- Applications of Trees.

UNIT IV: Graphs: Basic Terminology – Representation of Graphs. **Graph Traversals**: Breadth First Traversal and Depth First Traversal. **Applications of Graphs**: Minimum Cost Spanning tree and Dijkstra's Shortest Path.

UNIT V: Searching: Linear Search and Binary Search. **Sorting**: Bubble Sort, Selection Sort, and Insertion Sort. **Hashing**: Introduction – Hash table structure – Hash Functions. **Collision Resolution**: Linear Open Addressing and Chaining.

TEXT BOOKS:

1. **G.A. Vijayalakshmi Pai**, "*Data structures and Algorithms- Concepts, Techniques and Applications"*, First Edition, 2011, Tata McGraw-Hill.

REFERENCE BOOKS:

1. **Dr. A. Chitra**, "*Data Structures*", Vijay Nicole Imprints Private Limited.
2. **S. Sahni and E. Horowitz**, "*Fundamentals of Data Structure*", Ninth Edition, Galgotia Publications.

E- REFERENCES:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/data_str_algo/frameset.htm
2. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
3. en.wikibooks.org/wiki/Data_structures

THIRD SEMESTER

CORE PAPER VII - GRAPHICS AND MULTIMEDIA

UNIT I: Introduction and Applications of Graphics – **Video Display Devices**: CRT, Raster scan display, Random scan display, Color CRT Monitors, DVST, Flat-Panel displays, Input Devices, Printers. **Output Primitives**: DDA Line drawing algorithm – Bresenham's Circle drawing algorithm.

UNIT II: Basic Transformations of 2D: Translation, Rotation, Scaling and other transformations, Matrix Representations, Homogeneous Co-ordinates and Composite transformations. **Basic Transformations of 3D:** Translation, Rotation, Scaling and other transformations. **Projections**: Parallel projection and Perspective projection.

UNIT III: Polygon Clipping Algorithms: Sutherland Hodgeman Clipping. **Visible Surface Detection Methods:** Visible surface detection – Back Face detection – Depth-Buffer method-A Buffer method. **Polygon Surfaces:** Polygon tables – Plane equations- Polygon meshes. **Filled Area Primitives:** Boundary fill algorithm.

UNIT IV: Multimedia Systems Design: Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards – Multimedia databases.

UNIT V: Hypermedia: Multimedia authoring and user interface – Hypermedia messaging- Mobile messaging- Hypermedia message component- Creating hypermedia message – Integrated multimedia message standards – Integrated document management- Distributed multimedia systems.

TEXT BOOKS:

1. **Donald Hearn and M. Pauline Baker**, "*Computer Graphics C Version*", Pearson Education.
2. Andleigh, P.K. and Kiran Thakrar, "Multimedia Systems and Design", PHI.

REFERENCE BOOKS:

1. **W.M. Newman and R.F.Sproull**, "*Principles of Interactive Computer Graphics*", Tata McGraw Hill International Edition.
2. **Judith Jeffcoate**, "*Multimedia in practice: Technology and Applications*", PHI.

E-REFERENCES:

1. nptel.ac.in/syllabus/106102063/
2. http://www.uptu.ac.in/pdf/sub_ecs_504_30sep14.pdf
3. www.tutorialfind.com/tutorials/multimedia
4. www.pdftutorials.com/multimedia/multimedia

THIRD SEMESTER

CORE PRACTICAL III - JAVA PROGRAMMING LAB

APPLICATIONS:

1. Program using Class and Object.
2. Program using Constructors.
3. Program using Command-Line Arguments.
4. Program using Random Class.
5. Program using Vectors.
6. Program using StringTokenizer Class.
7. Program using Interface.
8. Program using all forms of Inheritance.
9. Program using String class.
10. Program using StringBuffer class.
11. Program using Exception Handling.
12. Implementing Thread based applications
13. Program using Packages.
14. Program using Files.

APPLETS:

15. Working with Colors and Fonts.
16. Parameter passing technique.
17. Drawing various shapes using Graphical statements.
18. Usage of AWT components and Listener in suitable applications.

THIRD SEMESTER

CORE PRACTICAL IV - DATA STRUCTURES LAB

1. Stack implementation using array.
2. Queue implementation using array.
3. Stack implementation using linked list.
4. Queue implementation using linked list.
5. Inorder Binary tree traversal.
6. Preorder Binary tree traversal.
7. Postorder Binary tree traversal.
8. Breadth First Graph Traversal.
9. Depth First Graph Traversal.
10. Linear search.
11. Binary search.
12. Bubble sort.
13. Selection sort.
14. Insertion sort.
15. Hashing technique.

FOURTH SEMESTER

CORE PAPER VIII - PYTHON PROGRAMMING

UNIT I: Basics of Python Programming: History of Python-Features of Python-Literal constants-Variables - Identifiers–Keywords-Built-in Data types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays**: Defining and Processing Arrays – Array methods.

UNIT II: Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. **Iterative Statements**: while loop, for loop, else suite in loop and nested loops. **Jump Statements**: break, continue and pass statements.

UNIT III: Functions: Function Definition – Function Call – Variable Scope and its lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings**: String operations-Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.

UNIT IV: **Lists**: Creating a list -Access values in list-Updating values in lists-Nested lists-Basic list operations-List Methods. **Tuples**: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries**: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.

UNIT V:Python File Handling: Types of files in Python - Opening and Closing files-**Reading and Writing files**: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.

TEXT BOOK:

1. **Reema Thareja**, "*Python Programming using problem solving approach*", First Edition, 2017, Oxford University Press.
2. **Dr. R. Nageswara Rao,** *"Core Python Programming"*, First Edition, 2017, Dreamtech Publishers.

REFERENCE BOOKS:

1. **Vamsi Kurama,** "*Python Programming: A Modern Approach*", Pearson Education.
2. **Mark Lutz**, "*Learning Python*", Orielly.
3. **Kenneth A. Lambert**, "*Fundamentals of Python – First Programs*", CENGAGE Publication.

E-REFERENCES:

1. https://www.programiz.com/python-programming
2. https://www.guru99.com/python-tutorials.html

FOURTH SEMESTER

CORE PAPER IX - OPERATING SYSTEMS

UNIT I: **Introduction**: Views – Goals – Types of system – OS Structure: Components – Services – System Calls. **Process Management:** Process - Process Scheduling – Cooperating Process – Interprocess Communication- Types of threads. **CPU Scheduling**: CPU Schedulers – Scheduling criteria – CPU Scheduling Algorithms.

UNIT II: **Process Synchronization**: Critical-Section problem –Semaphores. **Deadlocks**: Characterization – Methods for handling Deadlocks – Prevention, Avoidance, and Detection of Deadlock - Recovery from deadlock.

UNIT III: Memory Management: Address Binding – Dynamic Loading and Linking – Overlays –Swapping- Logical and Physical Address Space - Contiguous Allocation – Internal and External Fragmentation - Non Contiguous Allocation- Paging and Segmentation schemes.

UNIT IV: Virtual Memory: Demand Paging –Page Replacement Algorithms – Thrashing. **Protection**: Goals-Principles-Domain of Protection –Access Matrix.

UNIT V: File-System Interface: File Concepts – Access methods – Directory Structure – Protection and consistency semantics. **File-System Implementation**: File system structure-Allocation methods-Free Space Management.

TEXT BOOK:

1. **Silberschatz A., Galvin P.B., Gange**, *"Operating System Concepts"*, Ninth Edition, 2015, John Wiley & Sons.

REFERENCE BOOKS:

1. **Bhatt P. C. P**., "*An Introduction to Operating Systems: Concepts and Practice*", Third Edition, 2010, Prentice Hall of India.
2. **William Stallings**, "*Operating Systems: Internals and Design Principles*", Pearson, 2015, Global Edition.

E-REFERENCES:

1. http://engineeringppt.blogspot.in/2009/07/operating-system-concepts-8th-edition.html
2. http://www.gobookee.com/search.php?q=operating+sysytem+ebook
3. http://www.ebook3000.com/Modern-Operating-Systems--2nd-Edition-_10971.html

FOURTH SEMESTER

CORE PAPER X - SOFTWARE ENGINEERING

UNITI: Introduction to Software Engineering: Need and Software problem -Software Crises – A Process framework - **Process models**: The waterfall model – Incremental process models – Prototyping – The Spiral model. **System Engineering Hierarchy**: System modeling and simulation.

UNITII: Project Management: The Management Spectrum – The People –The Product – The Process – The Project – The W5HH Principle. **Metrics in the Process and Project Domains**: Metrics in the Process and Project Domains – Process Metrics and Project Metrics – Software measurement- Size-oriented metrics – Function-oriented metrics. **Project Scheduling:** Defining task set and a task network – Scheduling – Timeline charts – Tracking the Schedule.

UNITIII: Software Design: Design concepts-Abstraction – Architecture Modularity. **Basic Design Principles:** Component-level Design Guidelines- Cohesion – Coupling- Designing Conventional Components-Graphical Design Notation – Tabular Design Notation – Program Design Language – Comparison of notations.

UNITIV: Risk Management: Reactive and Proactive risks – Software risks – Risk identification – Risk projection- Risk Refinement – Risk mitigation, monitoring and management – The RMMM plan. **Software Quality Assurance**: Concepts - SQA activities – Formal Technical Reviews (FTR).

UNITV: Software Testing: Definition- Verification and validation – Test strategies – Unit Testing – Integration Testing – Alpha and Beta testing – White Box testing – Basis path testing – Control Structure Testing – Black box testing. **Software Configuration Management (SCM):** Elements of SCM – Baselines – The SCM repository.

TEXT BOOK:

1. **Roger S. Pressman,** "*Software Engineering a Practitioner's Approach*", Seventh Edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. **Watts S. Humphrey**, "*A Discipline for Software Engineering*", Addition Wesley Company.
2. **Sommerville**, "*Software Engineering*", Ninth Edition, Pearson Education.

E-REFERENCES:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
2. http://it-ebooks.info/book/2609/

FOURTH SEMESTER

CORE PRACTICAL V - PYTHON PROGRAMMING LAB

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.

FOURTH SEMESTER

CORE PRACTICAL VI - OPERATING SYSTEM AND SHELL PROGRAMMING LAB

1. **Shell Programming**
    a. Basic arithmetic Operations
    b. If statement
    c. While loop
    d. Electricity Bill
    e. Mark Sheet Processing
2. **Process Management**
    a. Display Process identifier
    b. Suspension of Process
    c. Producer-Consumer Problem
    d. Display the contents of a directory
    e. Interprocess Communication (IPC)
3. **CPU Scheduling Algorithms**
    a. First Come First Serve Algorithm
    b. Shortest Job First Algorithm
    c. Priority Scheduling Algorithm
4. **Memory Management Schemes**
    a. First-Fit Algorithm
    b. Best-Fit Algorithm
    c. Worst-Fit Algorithm
    d. Paging
5. **Virtual Memory**
    a. FIFO Page replacement Algorithm

FIFTH SEMESTER

CORE PAPER XI - DOT NET PROGRAMMING

UNIT I: **HTML**: Introduction– HTML Document Structure- Header Styles – Text Formatting – Types of List –HTML Table - Linking documents using Anchor tag - Forms – Basic controls in form – Image tag.

UNIT II: **VB.Net Basics**: Dot Net Framework Basics - Visual Studio Environment —– Data Types , Variables, constants ,Operators and Expressions – Decisions and Conditions - Loops - Arrays - Sub Procedures and Functions – Built-In functions.

UNIT III: **VB.Net Advanced**: Windows Forms and Basic Controls - Timer control - Graphics and Animation: The Graphics Environment – Simple Animation – Scroll Bar Controls - Menus and Status Bars- Multi Form applications - Exception Handling.

UNIT IV: **ASP.NET Basics**: ASP.NET Language Structure - Page Structure - Page event, Properties & Compiler Directives. **Basic Web Server Controls**: TextBox, Label, Button, CheckBox, RadioButton and LinkButton. **Validation Controls**: RequiredValidator, CompareValidator and RegularExpressionValidator. **DataListWebserver Controls**: ListBox, CheckboxList, RadioButtonList, DropDownList and Data Grid control.

UNIT V: ASP.NET Advanced: Request and Response Objects, Cookies, Session Management. **Working with Data**: OLEDB Connection class, Command class, DataSet Class and DataAdapter class - Program using database connectivity.

.

TEXT BOOKS:

1. **Thomas A Powell**, "*The Complete Reference HTML*", Fifth Edition, 2017, TMH.
2. **Julia Case Brandley, Anita C. Millspaugh**,"*Programming in Visual Basic.Net*", 2003, Tata McGraw Hill.
3. **G. Buczek**, "*ASP.NET Developers Guide*", 2017, Tata McGraw Hill.

REFERENCE BOOKS:

1. **C. Xavier** ,"*World Wide Web Design with HTML*", First Edition, TMH.
2. **Crouch**, "*ASP.NET and VB.NET Web Programming*", 2002, Addison-Wesley Professional.

E-REFERENCES:

1. http:// www.w3schools.com/aspnet/default-asp
2. http://www.learnvisualstudio.net

FIFTH SEMESTER

CORE PAPER XII - DATABASE MANAGEMENT SYSTEMS

UNIT I: **Introduction**: Database System-Characteristics of Database Management Systems-Architecture of Database Management Systems-Database Models-System Development Life Cycle-Entity Relationship Model.

UNIT II: **Relational Database Model:** Structure of Relational Model-Types of keys. **Relational Algebra**: Unary operations-Set operations-Join operations. **Normalization**: Functional Dependency- First Normal form-Second Normal Form-Third Normal form- Boyce-Codd Normal Form-Fourth Normal Form.

UNIT III: **SQL**: Introduction. **Data Definition Language**: Create, alter, drop, rename and truncate statements. **Data Manipulation Language**: Insert, Update and Delete Statements. **Data Retrieval Language**: Select statement. **Transaction Control Language**: Commit, Rollback and Savepoint statements. **Single row functions using dual**: Date, Numeric and Character functions. **Group/Aggregate functions:** count, max, min, avg and sum functions. **Set Functions**: Union, union all, intersect and minus. **Subquery**: Scalar, Multiple and Correlated subquery. **Joins**: Inner and Outer joins. **Defining Constraints:** Primary Key, Foreign Key, Unique, Check, Not Null.

UNIT IV: PL/SQL: Introduction-PL/SQL Basic-Character Set- PL/SQL Structure-SQL Cursor-Subprograms-Functions-Procedures.

UNIT V: **Exception Handling:** Introduction-Predefined Exception-User Defined Exception-Triggers-Implicit and Explicit Cursors-Loops in Explicit Cursor.

TEXT BOOK:

1. **Pranab Kumar Das Gupta and P. Radha Krishnan**, "*Database Management System Oracle SQL and PL/SQL"*, Second Edition, 2013, PHI Learning Private Limited.

REFERENCE BOOKS:

1. **Ramez Elmasri and Shamkant B. Navathe**, "*Fundamentals of Database Systems*", Seventh Edition, Pearson Publications.
2. **Abraham Silberschatz, Henry Korth, S. Sudarshan**, "*Database System Concepts*", Seventh Edition, TMH.

E-REFERENCE:

1. http://www.amazon.in/DATABASE-MANAGEMENT-SYSTEM-ORACLE-SQL-ebook/dp/B00LPGBWZ0#reader_B00LPGBWZ0

FIFTH SEMESTER

CORE PAPER XIII - COMPUTER NETWORKS

UNIT I: Introduction: Definition and Uses of Computer Networks. **Network Hardware/Categories of Networks:** LAN, WAN and MAN. **Line Configuration**: Point to point and Multipoint. **Topology**: Mesh, Star, Tree, Bus, Ring and Hybrid Topologies. **Transmission Mode**: Simplex, Half duplex and Full Duplex. **Network Software:** Protocol Hierarchies- Connection Oriented and Connectionless Services – Service Primitives. **Reference Models:** OSI Reference Model – TCP/IP reference Model.

UNIT II: Physical Layer: Guided Transmission Media: Magnetic Media, Twisted Pair, Coaxial Cable and Fiber Optics. **Wireless Transmission**: Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission and Light Waves. **The Public Switched Telephone Network:** Structure of a Telephone System.

UNIT III: Data Link Layer -Design Issues: Framing, Error Control and Flow Control. **Error Correcting Codes**: Hamming Codes and Convolutional Codes. **Error Detecting Codes:** Parity, Checksums and CRCs. **Elementary Data-link Protocols:** A Utopian Simplex Protocol. **Sliding Window Protocols:** A One-Bit Sliding Window Protocol.

UNIT IV: Network Layer- Design Issues: Store and Forward Packet Switching – Services provided to transport layer. **Routing Algorithms:** The Optimality Principle, Flooding, The Shortest Path routing and Hierarchical Routing. **Congestion Control Algorithms**: Approaches to Congestion Control - Traffic Aware Routing and Admission Control.

UNIT V: Transport Layer-Elements of Transport Protocols: Addressing, Error control and Flow control, Multiplexing and Crash recovery. **TCP**: Introduction, TCP Service model and TCP Segment Header. **Application Layer:** DNS – Electronic Mail – The World Wide Web.

TEXT BOOK:

1. **Andrew S. Tanenbaum and David J. Wetherall,** "*Computer Networks*", Fifth edition, 2011, PHI.

REFERENCE BOOKS:

1. **Behrouz A. Forouzan**, "*Data Communication and Networking*", Fifth Edition, Tata McGraw Hill.
2. **William Stallings**, "*Data and Computer Communications*", Eighth Edition, Pearson education Asia.

E-REFERENCES:

1. http://nptel.iitm.ac.in/courses/IIT-MADRAS/Computer_Networks/index.php
2. http://www.cse.iitk.ac.in/users/dheeraj/cs425/
3. http://people.du.ac.in/~ngupta/teach_networks.html

FIFTH SEMESTER

PAPER XIV ELECTIVE 1- DATA MINING

UNIT I: Introduction: What is data mining? – Why data mining now? – Data mining process – Data mining applications – Data mining techniques – Practical examples.

UNIT II: Data Understanding and Data Preparation: Introduction – Data collection and preprocessing – Outliers – Types of data – Computing Distance – Displaying data graphically.

UNIT III: Association Rules Mining: Introduction - Basics – Naïve algorithm – Improved Naïve algorithm – The Apriori algorithm – Improving the efficiency of the Apriori algorithm – Direct Hashing and Pruning.

UNIT IV: Classification: Introduction –Decision tree - The Tree Induction Algorithm – Split algorithm based on Information Theory – Naïve based method - Improving accuracy of Classification Methods – Evaluation criteria of classification methods.

Unit V: Cluster Analysis: Introduction – Features of Cluster Analysis – Types of Cluster Analysis – The K-Means method – Hierarchical method – Agglomerative Method - Quality and Validity of Cluster Analysis Method.

TEXT BOOK:

1. **G. K. Gupta**, "Introduction to Data Mining with Case Studies", 3rd Edition, 2014, PHI.

REFERENCE BOOKS:

1. **Jiawei Han and Micheline Kamber**,"*Data Mining Concepts & Techniques*", Third Edition, Academic Press.
2. **Margaret H. Dunbam**,"*Data Mining Introductory and Advanced Topics*", First Edition, Pearson Education.

E-REFERENCES:

1. http://guidetodatamining.com/
2. http://freecomputerbooks.com/Introduction_to_Data_Mining.html
3. http://it-ebooks.info/book/2506/

FIFTH SEMESTER

PAPER XIV ELECTIVE 1- ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

UNIT I: **Introduction**: Definition, AI Problems, AI Applications, AI techniques, Criteria for success. **Problems, Problem Spaces, Search**: Defining the problem as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics.

UNIT II: Heuristic Search Techniques: Generate and Test – Simple Hill Climbing – **Best First Search:** OR graphs, The A* Algorithm. **Problem Reduction**: AND OR graphs, The AO* Algorithm. Constraint Satisfaction.

UNIT III: Knowledge Representation Issues: Representations and Mappings – **Approaches to Knowledge representations**: Properties for Knowledge representation systems, Simple relational knowledge- Issues in Knowledge representations – The Frame Problem.

UNIT IV: Using Predicate Logic: Representing simple facts in logic – Representing Instance and ISA relationships – Computable functions and predicates – Resolution – Natural deduction.

UNIT V: Expert Systems: Definition-Characteristics of Expert Systems –Architecture of Expert Systems -Benefits and Limitations of Expert Systems – Development states of an Expert System -Applications of Expert Systems – Expert System tools.

TEXT BOOKS:

1. **Stuart Russell & Peter Norvig**, "*Artificial Intelligence a modern Approach*", Second Edition, Pearson Education.
2. **E. Rich, K. Knight and Shivashankar B. Nair**, "*Artificial Intelligence*", Third Edition, TMH.

REFERENCE BOOKS:

1. **V S Janaki Raman, K Sarukesi, P Gopalakrishnan, "***Foundations of Artificial Intelligence and Expert Systems"*, MacMillan India limited.
2. **D.W. Patterson, "***Introduction to AI and Expert Systems***",** PHI**.**

E-REFERENCES:

1. www.vssut.ac.in/lecture_notes/lecture1428643004.pdf
2. http://vfu.bg/en/e-Learning/Artificial-Intelligence--AI_and_ES_Nowledge_base_systems.pdf

FIFTH SEMESTER

PAPER XIV ELECTIVE 1 - OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT I: Object Basics – Object Oriented methodologies: Introduction, The Unified Approach – UML.

UNIT II: Use Case Models – Object Analysis – Identifying Object relationships – Attributes – Methods – Case Studies.

UNIT III: Design Processes – Design Axioms – Class design – Object Storage: Object Oriented database management systems, Object relational systems, Designing access layer classes. Case Studies.

UNIT IV: User interface design – View Layer Classes – Micro level processes – View Layer interface - Case Studies.

UNIT V: Object orientation on testing – Test cases – Test plans – Continuous testing – Debugging principles – System usability – Measuring user satisfaction – Case studies.

TEXT BOOK:

1. **Ali Bahrami**, "*Object Oriented System Development*", Second Edition, Tata McGraw Hill International Edition.
2. **Grady Booch, James Rumbaugh, Ivar Jacobson**, "*The Unified Modeling Language User Guide*", Second Edition, Addison Wesley.

REFERENCE BOOKS:

1. **Brahma Dathan, Sarnath Ramnath**, "*Object-Oriented Analysis, Design and Implementation*", Second Edition, Universities Press.
2. **Martin Fowler**, "*UML Distilled A Brief Guide to Standard Object Modeling Language*", Third Edition, AddisonWesley.

E-REFERENCES:

1. http://www.auupdates.com/2014/03/cs2353-object-oriented-analysis-and_3881.html
2. http://it-ebooks.info/book/1403/

FIFTH SEMESTER

CORE PRACTICAL VII - DOT NET PROGRAMMING LAB

1. Creation of a personal web page (with multiple html documents and appropriate links)
2. Preparation of a bio data using various HTML Controls
3. Design a VB.Net form for Student manipulation.
4. Design a VB.Net form for Inventory control system.
5. Create an ASP.Net application form to apply for a new course in a college, fill the information and submit it(Use Basic webserver controls).
6. Design Sign Up form and validate the values: User Name (Minimum 8 character Maximum 15 and only characters and underscore), Password (Minimum 8 Characters) and Confirm Password (Both should be same), Phone No (Only digits), Email-id(should contain @ symbol) etc.
7. Demonstration of Request and Response Objects
8. Create an employee database and manipulate the records.
9. Demonstration of Cookies.
10. Create a web form for Online Library data entry using Session variables.

FIFTH SEMESTER

CORE PRACTICAL VIII - RDBMS LAB USING ORACLE

SQL:

1. DDL commands.
2. Specifying constraints-Primary Key, Foreign Key, Unique, Check, Not Null.
3. DML commands.
4. Set Operations.
5. Joins.
6. Sub-queries.

PL/SQL:

7. Control Constructs.
8. Exception Handlers.
9. Implicit Cursor.
10. Explicit Cursor.
11. Procedures.
12. Functions.
13. Triggers.
14. TCL Commands usage (Commit, Rollback, Savepoint)

SIXTH SEMESTER

CORE PAPER XV - PHP PROGRAMMING

UNIT I: Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

UNIT II: Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

UNIT III: Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.

UNIT IV: Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. **Working with Files and Directories:** Reading Files-Writing Files- Processing Directories – Cookies – Session Management.

UNIT V: Working MySQL with PHP: Database connectivity- Usage of MYSQL commands in PHP- Processing result sets of queries- Validating user input through Database layer and Application layer- Formatting query output with Character, Numeric, Date and time.

TEXT BOOKS:

1. **Vikram Vaswani**, *"PHP A Beginner's Guide*", First Edition, TMH.
2. **Mike Mcgrath**, "*PHP and MySQL*", 2012, TMH.

REFERENCE BOOKS:

1. **Rasmus Lerdorf, Kevin Tatroe**, *"Programming PHP"*, Third Edition, O'Reilly.
2. **Robin Nixon**," *PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites"*, First Edition, O'Reilly Media.
3. **Leon Atkinson**, "*Core PHP Programming*", Prentice Hall, ISBN 0130463469.
4. **W. Jason Gilmore**, "*Beginning PHP5 and MySQL: From Novice to Professional*", 2004, Apress, ISBN: 1-893115-51-8.
5. **Steven Holzner**, "*The PHP Complete Reference*", Tata McGraw-Hill.

E-REFERENCES:

1. http://www.w3schools.com/php/
2. http://www.codingunit.com/php-tutorial-language-introduction

SIXTH SEMESTER

CORE PAPER XVI - MOBILE APPLICATION DEVELOPMENT

UNIT I: Android Fundamentals: Android overview and Versions –Features of Android – Architecture of Android - Setting up Android Environment (Eclipse/Android Studio, SDK, AVD)- Anatomy of an Android Application - Simple Android Application Development.

UNIT II: Android User Interface: Layouts: Linear, Relative, Frame and Scrollview-Managing changes to Screen Orientation. **Views**: TextView, Button, ImageButton, EditText, CheckBox, RadioButton, RadioGroup, ProgressBar, AutoCompleteTextView, ListViews and WebView.

UNIT III: Data Persistence: Saving and Loading User Preferences. **File Handling**: File System-Internal and External Storage-Permissions-File Manipulation-**Managing Data using Sqlite:** Creation of database-Insertion, Retrieval and Updation of records.

UNIT IV: SMS Messaging: Sending and Receiving messages - Sending E-mail **–Networking:** Downloading Binary Data – Downloading Text Files.

UNIT V: Location Based Services: Displaying maps- Displaying zoom control- Changing view – Adding Markers- Getting the location – Geocoding. **Publishing Android Applications:** Preparing for publishing-Deploying APK Files.

TEXT BOOK:

1. **WeiMeng Lee (2012),** "*Beginning Android Application Development*", Wrox Publications (John Wiley, New York)

REFERENCE BOOKS:

1. **Ed Burnette**, "*Hello Android: Introducing Google's Mobile Development Platform*", 3rd edition, 2010, The Pragmatic Publishers.
2. **Reto Meier**, "*Professional Android 4 Application Development*", 2012, Wrox Publications (John Wiley, New York).

E-REFERENCES:

1. https://www.tutorialspoint.com/mobile_development_tutorials.htm
2. https://www.tutorialspoint.com › Android › Android - Home

SIXTH SEMESTER

CORE PAPER XVII - DESIGN AND ANALYSIS OF ALGORITHMS

UNIT I : Introduction: Problem solving – Procedure – Top-Down and Bottom- up approaches to algorithm design – Use of algorithms in problem solving– Characteristics of algorithmic language. **Developing an algorithm**: Design of algorithms – Implementation of algorithm – Verification of algorithm. **Efficiency analysis of algorithms**: Space complexity, Time complexity, and Frequency count – Analysis of Linear Search.

UNIT II: Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort. **Greedy Method**: General method – Optimal storage on tapes – Knap sack problems – Job sequencing with deadlines – Optimal Merge Patterns.

UNIT III: Dynamic Programming: General Method – Multistage Graphs – All-Pair Shortest Paths – 0/1 Knapsack.

UNIT IV: Backtracking: General Method – N-Queens Problem – Sum of Subsets – Graph Coloring - Hamiltonian Cycle Problem.

UNIT V: Branch and Bound: General Method (FIFO and LC) – 0/1 Knapsack Problem – Travelling Salesman Problem.

TEXT BOOKS:

1. **A.A Puntambekar**, "*Analysis and Design of Algorithms*", Technical Publications.
2. **I. Chandra Mohan**,"*Design and Analysis of Algorithms"*, PHI Learning Pvt. Ltd.

REFERENCE BOOKS:

1. **Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "***Computer Algorithms*", Second Edition, Universities Press.
2. **K. RaghavRao**, "*Introduction to Design Analysis of Algorithms*", 2013, SmashWords.

E-REFERENCES:

1. http://people.du.ac.in/~ngupta/teach_algorithms_cs301.html#301
2. http://www.uptu.ac.in/pdf/sub_ecs_502_30sep14.pdf

SIXTH SEMESTER

PAPER XVIII ELECTIVE 2 - OPERATIONS RESEARCH

UNIT I: Basics of Operations Research (OR): Characteristics of O.R-Necessity of O.R in Industry-OR and Decision making- Role of computers in O.R..**Linear Programming**: Formulations and Graphical solution (of 2 variables only) canonical and standard terms of Linear programming problem.

UNIT II: Algebraic Solution: Simplex method -Charnes method of penalties – Two Phase Simplex Method – Big-M Method – Concept of Duality- Properties of Duality.

UNIT III: Transportation Model: Definition –n formulation and solution of transportation models- North–West Corner Method- the row – minima, column – minima, matrix minima and Vogel's approximation methods **(Note: no optimal solution problems)**. **Assignment Model**: Definition of Assignment Model – comparison with Transportation Model – solution of Assignment model –Variations of Assignment problem – Finding Optimal Solution of Assignment Problem.

UNIT IV: Sequencing Problem: Processing each of 'n' jobs through m machines – Processing 'n' jobs through 2 machines – Processing 'n' jobs through 3 machines – Processing 2 jobs through 'm' machines – Processing 'n' jobs through 'm' machines – Travelling Salesman Problem. **Game Theory**: Characteristics of games – Maximin, Minimax criteria of optimality – Dominance property – Algebraic solution of solving games.

UNIT V: Pert – CPM Networks- Fulkerson's Rule- Measure of activity – PERT computation-CPM computation – Resource Scheduling – Floats Calculations.

TEXTBOOK:

1. **KantiSwarub, P.K.Gupta, Manmohan**, "*Operations Research*", S. Chand & Sons.

REFERENCE BOOKS:

1. **Ackoff R. L. and Sasieni M.W**, "*Fundamentals of Operations Research*", John Wiley & Sons, New York.
2. **Charnes A. Cooper W. and Hendersen A**., "*Introduction to Linear Programming*", Wiley & Sons. New York.
3. **Srinath L.S**."*PERT and CPM Principles and Applications*", Affiliated East West Press Pvt. Ltd., New York.

E-REFERENCES:

1. https://en.wikipedia.org/wiki/Operations_research
2. https://books.google.co.in/books?isbn=3642484174
3. https://www.mendeley.com/.../management-science-Operations-Research

SIXTH SEMESTER

PAPER XVIII ELECTIVE 2 - E-COMMERCE

UNIT I: E-Commerce Framework – E-Commerce and Media Convergence – The anatomy of E-commerce applications - E-Commerce Consumer Applications - E-Commerce Organization Applications.

UNIT II: The Internet Terminology – NSFNET – Architecture and Components – National Research and Education Network – Internet Governance – An overview of Internet Applications. **The Business of Internet Commercialization**: Telco/Cable/Online companies - National Independent ISPs – Regional level ISPs – Local level ISPs.

UNIT III: E-Commerce and the World Wide Web: Architectural Framework for E-commerce – WWW as the architecture – Technology behind the web – Security and the web.

UNIT IV: Electronic Payment Systems: Types of Electronic Payment Systems – Digital token Electronic Payment Systems – Credit Card Based Electronic Payment Systems – Risk and Electronic Payment Systems. **Electronic Data Interchange**: Legal, Security and Privacy issues.

UNIT V: Advertising and Marketing on the Internet: E-Commerce Catalogs – Information Filtering – Consumer Data Interface – Emerging tools. **Software Agents**: Characteristics and Properties of Software Agents – Technology behind Software Agents - Applets, Browsers, and Software Agents.

TEXT BOOK:

1. **Ravi Kalakota& Andrew Whinston,** "*Frontiers of Electronic-Commerce*", Addison Wesley.

REFERENCE BOOKS:

1. **Efraim Turvan J.Lee, David Kug and Chung**, "*Electronic Commerce*" Pearson Education Asia.
2. **Manlyn Greenstein and Miklos**, "*Electronic Commerce*" TMH.

E-REFERENCES:

1. https://www.the-reference.com/en/expertise/creation-and.../e-commerce
2. https://en.wikipedia.org/wiki/E-commerce
3. https://www.tutorialspoint.com/e_commerce/index.htm

SIXTH SEMESTER

PAPER XVIII ELECTIVE 2 - CRYPTOGRAPHY

UNIT I: Introduction: The OSI security Architecture – Security Attacks –Security Mechanisms – Security Services – A model for network Security.

UNIT II: Classical Encryption Techniques: Symmetric cipher model – **Substitution Techniques:** Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Steganography.

UNIT III: Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – **RSA:** The RSA algorithm.

UNIT IV: Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. **Web Security**: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.

Unit 5: System Security: Intruders – Malicious software – Firewalls.

TEXT BOOK:

1. **William Stallings**, "*Cryptography and Network Security Principles and Practices"*,

REFERENCE BOOKS:

1. **Behrouz A. Foruzan, "***Cryptography and Network Security***",** Tata McGraw-Hill, 2007.
2. **Atul Kahate**, "*Cryptography and Network Security*", Second Edition, 2003, TMH.
3. **M.V. Arun Kumar**, "*Network Security*", 2011, First Edition, USP.

E-REFERENCES:

1. https://www.tutorialspoint.com/cryptography/
2. https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography

SIXTH SEMESTER

CORE PRACTICAL IX - PHP PROGRAMMING LAB

1. PHP Variables and constants
2. PHP IF Statement
3. PHP Switch-case statement
4. PHP looping statement
5. PHP String functions
6. PHP mathematical functions
7. PHP numeric array
8. PHP associative array
9. PHP Multidimensional array
10. Array with forms
11. PHP Date and time functions
12. PHP User-defined functions
13. PHP Scope of variables
14. PHP Class and Object
15. PHP Cookies
16. PHP Sessions
17. Insertion of records into database using form
18. Viewing of records from database using form
19. Validating user-input using application layer
20. Validating user-input using database layer

SIXTH SEMESTER

CORE PRACTICAL X - MOBILE APPLICATION DEVELOPMENT LAB

1. Develop an application for Simple Counter.
2. Develop an application to display your personal details using GUI Components.
3. Develop a Simple Calculator that uses radio buttons and textview.
4. Develop an application that uses Intent and Activity.
5. Develop an application that uses Dialog Boxes.
6. Develop an application to display a Splash Screen.
7. Develop an application that uses Layout Managers.
8. Develop an application that uses different types of Menus.
9. Develop an application that uses to send messages from one mobile to another mobile.
10. Develop an application that uses to send E-mail.
11. Develop an application that plays Audio and Video.
12. Develop an application that uses Local File Storage.
13. Develop an application for Simple Animation.
14. Develop an application for Login Page using Sqlite.
15. Develop an application for Student Marksheet processing using Sqlite.