DEPARTMENT OF COMPUTER SCIENCE
BHARATHIDASAN GOVERNMENT COLLEGE FOR WOMEN
(AUTONOMOUS)

(AFFILIATED TO PONDICHERRY UNIVERSITY)

PUDUCHERRY- 605003

B.Sc. (Computer Science)
3-YEAR FULL TIME PROGRAMME

RULES, REGULATIONS AND COURSE CONTENTS

(With Effective from 2016-2017 Batch)

GOVERNMENT OF PONDICHERRY
BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (AUTONOMOUS)
(AFFILIATED TO PONDICHERRY UNIVERSITY)

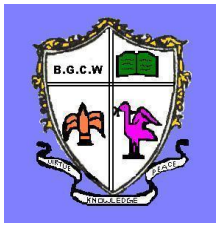
CBCS COURSE STRUCTURE AND SCHEME OF EXAMINATION-2016-17 ADMISSION ONWARDS

For

BACHELOR OF SCIENCE (B.Sc)

IN

COMPUTER SCIENCE



DEPARTMENT OF COMPUTER SCIENCE
BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (AUTONOMOUS)
PUDUCHERRY

CBCS COURSE STRUCTURE AND SCHEME OF EXAMINATION
(Effective for students to be admitted from the academic year 2016-2017)

2016-2017

Bharathidasan Government College for Women (Autonomous)
Puducherry
BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

(Effective from the Academic Year 2016-2017)

Aim of the Course

The Degree of Bachelor of Computer Science aims to introduce to Computer Science and its applications. At the end of the course, the students are expected to have good working knowledge in Computer Systems, Technologies and its Applications.

Eligibility for Admission

Candidates for admission to B.Sc. in Computer Science shall be required to have passed Higher Secondary Examination or its equivalent with Computer Science / Mathematics / Business Mathematics as one of the subjects of study.

Lateral Entry

Candidates who have passed Diploma in Computer Science / Computer Technology / Information Technology / Computer Application in I Class (10+3 years of study) are eligible to apply for the lateral entry to the 2nd year of the course subject to availability of seats, but limited to 10% of the sanctioned intake.

Duration of the Course

The course shall be of three years duration spread over six consecutive semesters. The maximum duration to complete the course shall be 5 years.

Medium

The medium of instruction shall be English.

Details of Marks and Passing

The breakup of mark between CIA & ESE is 25:75

Passing Minimum – Theory and Practical: There is no minimum passing mark for CIA. However, the passing minimum in ESE is 40 % that is 30 for 75 marks and minimum passing of overall total (CIA+ESE) is 40% that is 40 for 100.

Composition of Internal Marks for 25 as follows :

Theory

S.No	Component	Marks
1.	CIA Test	5
2.	Model Examination	10
3.	Assignment	5
4.	Attendance	5
	Total	25

Practical

S.No	Component	Marks
1.	Model Practical	15
2.	Skill & Observation in Lab	5
3.	Attendance	5
	Total	25

Project Work

Total Marks:100 (CIA:50 + ESE:50)

Project - Internal Assessment:

The following components are considered during the internal assessment for Project Work.

Component	Internal Assessment (50 Marks)
Periodical Internal Project Review	30 Marks
Project Presentation & Model Viva- voce	20 Marks

Project – External Assessment:

External Examiner evaluates the project out of 50 marks for the Project Work, Project Report and Project Viva Voce.

Component	External Assessment (50 Marks)
Project Work & Project Report	30
Project Viva-voce	20

Question Paper Pattern for B.Sc.(CS) Courses

S.No.	Section		Marks
1	**A**	**10 Questions to Answered out of 12 given (10*2=20)**	**20**
2	**B**	**5 Questions to be Answered out of 8 given (5*5=25)**	**25**
3	**C**	**3 Questions to be Answered out 5 given (3*10=30)**	**30**
		Total	**75**

Commencement of this Regulation: These regulations shall take retrospective effect from the academic year 2016-17, i.e, for students getting admitted to the first year of the course from the academic year 2016-17 and thereafter.

CREDIT DISTRIBUTION

Semester	I	II	III	IV	V	VI	Total Credits
Part-I-Language	3	3					6
Part-II-English	3	3	3	3			12
Core- Theory	7	10	8	13			38
Core/DSE-Practical	4	4	4	4	4	2	22
DSE (Discipline Specific Elective)					13	14	27
Core-Allied	5		5				10
SEC (Skill Enhancement Course)			2	2	2	2	8
AECC(Ability Enhancement Compulsory Course) - EVS & Public Administration		2			2		4
	22	22	22	22	21	18	**127**
Total Credits							**127**

DSE - Discipline Specific Elective
SEC - Skill Enhancement Course
AECC - Ability Enhancement Compulsory Course
EVS - Environmental Science

BHARATHIDASAN GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), PUDUCHERRY

DEPARTMENT OF COMPUTER SCIENCE

B.Sc COMPUTER SCIENCE CBCS BASED SYLLABUS

Semester	Course Opted	Course Name	Credits	Hours/Week		CIA	External	Total Marks
				Theory	Practical			
FIRST SEMESTER	Language- Course-I	Language-I	3	6		25	75	100
	English Course-I	English-I	3	6		25	75	100
	Core Course-I	Digital Electronics	4	4		25	75	100
	Core Course-I Practical	Digital Electronics-Lab	2		3	25	75	100
	Core Course-II	Fundamentals of Computer	3	3		25	75	100
	Core Course-II Practical	Office Automation Lab	2		3	25	75	100
	Core Course-III-Allied	Mathematical Foundation for Computer Science	5	5		25	75	100
		Total	22 Credits	24 Hrs	6 Hrs			700

Semester	Course Opted	Course Name	Credits	Hours/Week		CIA	External	Total Marks
				Theory	Practical			
SECOND SEMESTER	Language- Course-II	Language-II	3	6		25	75	100
	English- Course-II	English-II	3	6		25	75	100
	Core Course-IV	Programming in C	3	3		25	75	100
	Core Course-IV Practical	C Programming Lab	2		3	25	75	100
	Core Course-V	Computer Architecture & Introduction to Microprocessor	3	4		25	75	100
	Core Course-V-Practical	Microprocessor Lab	2		2	25	75	100
	Core Course-VI	Computer Algorithms	4	4		25	75	100
	Ability Enhancement Compulsory Course-I	Environmental Science	2	2		25	75	100
		Total	22 Credits	25 Hrs	5 Hrs			800

Semester	Course Opted	Course Name	Credits	Hours/Week		CIA	External	Total Marks
				Theory	Practical			
THIRD SEMESTER	**English Course-III**	**English-III**	3	**6**		**25**	**75**	**100**
	Core Course-VII	**Data Structures**	4	**5**		**25**	**75**	**100**
	Core Course-VII Practical	**Data Structure Lab**	2		**3**	**25**	**75**	**100**
	Core Course-VIII	**Object Oriented Programming in C++**	4	**5**		**25**	**75**	**100**
	Core Course-VIII Practical	**Object Oriented Programming in C++ Lab**	2		**3**	**25**	**75**	**100**
	Core Course-IX-Allied	**Probability and Statistics**	5	**5**		**25**	**75**	**100**
	Skill Enhancement Course-I	1.RDBMS (MS Access). 2. Value Education. 3. Introduction to Computer Hardware & Assembling. **(Elect 1 out of 3)**	2	**3**	**3** **3**	**25**	**75**	**100**
		Total	**22 Credits**	**21Hrs**	**9 Hrs**			**700**

Semester	Course Opted	Course Name	Credits	Hours/Week		CIA	External	Total Marks
				Theory	Practical			
FOURTH SEMESTER	**English Course-IV**	**English-IV**	3	6		**25**	**75**	**100**
	Core Course-X	**Database Management System**	5	5		**25**	**75**	**100**
	Core Course-XI	**Programming in Java**	4	5		**25**	**75**	**100**
	Core Course - XI-Practical	**Java Lab**	2		**3**	**25**	**75**	**100**
	Core Course-XII	**Operating Systems**	4	5		**25**	**75**	**100**
	Core Course-XII-Practical	**Operating System Lab**	2		**3**			
	Skill Enhancement Course-II	1. Page maker. 2. General Aptitude. 3. Tally **(Elect 1 out of 3)**	2	3	**3** **3**	**25**	**75**	**100**
		Total	**22 Credits**	**21 Hrs**	**9 Hrs**			**600**

Semester	Course Opted	Course Name	Credits	Hours/Week		CIA	External	Total Marks
				Theory	Practical			
FIFTH SEMESTER	**Discipline Specific Elective-I**	1. C# and Dot Net Framework. 2. Computer Graphics. 3. Resource Management Technique. 4.Web Technology. 5. Cloud Computing. 6. Software Engineering. 7. Data Mining and Warehousing. (**Elect 3 out of 7)**	**4**	**5**		**25**	**75**	**100**
	DSE-I-Practical		**2**		**4**	**25**	**75**	**100**
	Discipline Specific Elective –II		**4**	**5**		**25**	**75**	**100**
	DSE-II-Practical		**2**		**4**	**25**	**75**	**100**
	Discipline Specific Elective –III		**5**	**5**		**25**	**75**	**100**
	Skill Enhancement Course-III	1. Introduction to DTP using Photoshop. 2. Python Programming 3. Android Programming **(Elect 1 out of 3)**	**2**		**4** **4** **4**	**25**	**75**	**100**
	Ability Enhancement Compulsory Course –II	Public Administration	**2**	**3**		**25**	**75**	**100**
		Total	**21 Credits**	**18 Hrs**	**12 Hrs**			**700**

Semester	Course Opted	Course Name	Credits	Hours/Week		CIA	External	Total Marks
				Theory	Practical			
SIXTH SEMESTER	**Discipline Specific Elective - IV**	1. Computer Networks. 2. Artificial Intelligence. 3. Advance Java Programming. 4. Mobile Computing. 5. Basics of Cyber Security. 6. E-Commerce 7. Project Work/Dissertation **(Elect 3 out of 7)**	**4**	**5**		**25**	**75**	**100**
	DSE-IV-Practical		**2**		**4**	**25**	**75**	**100**
	Discipline Specific Elective –V		**5**	**5**		**25**	**75**	**100**
	Discipline Specific Elective –VI		**5**		**12**	**25**	**75**	**100**
	Skill Enhancement Course-IV	1. PHP 2.MYSQL 3. Java Script **(Elect 1 out of 3)**	**2**		**4** **4** **4**	**25**	**75**	**100**
			18 Credits	**10 Hrs**	**20 Hrs**			**500**

Total Credits: 127

Discipline Specific Elective Papers(DSE)

Discipline Specific Elective Papers(DSE): Elect 03 Papers for Fifth Semester

S.No	Subjects
1.	C# and Dot Net Framework
2.	Computer Graphics
3.	Resource Management Technique
4.	Web Technology
5.	Cloud Computing
6.	Software Engineering
7.	Data Mining and Warehousing

Discipline Specific Elective Papers (DSE): Elect 03 Papers for Sixth Semester

S.No	Subjects
1.	Computer Networks
2.	Artificial Intelligence
3.	Advance Java Programming
4.	Mobile Computing
5.	Basics of Cyber Security
6.	E-Commerce
7.	Project Work/Dissertation

Skill Enhancement Courses (SEC)

Skill Enhancement Courses (SEC) –I- Elect 01 Paper for Semester 3 (Credit: 02)

S.No	Subjects
1	RDBMS (MS Access)
2	Value Education
3	Introduction to Computer Hardware & Assembling

Skill Enhancement Courses (SEC) –II- Elect 01 Paper for Semester 4 (Credit: 02)

S.No	Subjects
1	Page maker
2	General Aptitude
3	Tally

Skill Enhancement Courses (SEC)–III- Elect 01 Paper for Semester 5 (Credit: 02)

S.No	Subjects
1	Introduction to DTP using Photoshop
2	Python Programming
3	Android Programming

Skill Enhancement Courses (SEC) –IV- Elect 01 Paper for Semester 6 (Credit: 02)

S.No	Subjects
1	PHP
2	MYSQL
3	Advanced Java Script

List of Non Major Electives for other Courses in Fifth & Sixth Semester (Credits :05)

1. Non Major Electives for other Courses in Fifth Semester: Elect 01 Paper (Credits :05)

S.No	Subjects
1	Fundamentals of Computers and Office Automation
2	Basics of Internet and Browsing

2. Non Major Electives for other Courses in Sixth Semester: Elect 01 Paper (Credits:05)

S.No	Subjects
1	Animation using Flash Player
2	Web Designing using HTML

Semester I – **Core Course -I**

Course :**B.Sc**	Subject: **Computer Science**		Semester No.	**I**	
Paper No**. Core Course – I**			Paper Code	C0601	
Title of the Paper	**DIGITAL ELECTRONICS**		Marks for	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 4 hrs Practical -3hrs			Maximum Marks	100	100
Objectives	To provide a knowledge about the elementary aspects about the internal functioning of the computer.				
Total Instruction hours: 60					

Unit No.	**Contents**	**Hours of instruction**
I	Binary systems: Digital Systems, Binary Numbers, Number Base conversions , Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.	10
II	Binary Algebra and Logic Gates: Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and standard forms, Digital logic gates. Gate-level minimization: Map Method, Four Variable, Five Variable Map, Product of sum Minimization, Don't care conditions, NAND, NOR Implementation- -Exclusive-OR functions.	15
III	Combinational Logic: Combinational Circuits, Analysis and Design Procedure, Binary Adder, Subtractor, Decimal Adder, Magnitude Comparator, Decoders, Encoders, Multiplexers.	15
IV	Synchronous Sequential Logic: Sequential Circuits –Latches, Flip-Flops, and Analysis of clocked sequential Circuits, Flip-flop Excitation table - Design Procedure.	10
V	Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters.	10
Practical – 45 hours	**Core Course - I Practical -Digital Electronics Lab- Sub.Code:C0602** 1. Simplification 2. Full adder 3.Full subtractor 4. Parity checker 5. Decoder 6. Multiplexer 7. FlipFlops 8. Counters	
Text books	M.Morris Mano, "Digital Design", 3 rd edition ,Pearson Education ,Delhi,2002.	
References	1. M.Morris Mano, "Digital Logic and computer Design" ,PHI, New Delhi 2002. 2. M.Morris Mano, "Logic and Computer Design Fundamentals ",Pearson Education Asia,2002.	

Semester I – Core Course -II

Course: B.Sc	Subject: **Computer Science**		Semester No.	**I**	
Paper No: **Core Course -II**			Paper Code	C0603	
Title of the Paper	**Fundamentals of Computer**		Maximum Marks	Theory	Practical
Hours of Instruction per week	Theory	3 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory -3 hrs Practical – 3hrs			Total	100	100
Objectives: To learn about the basic concepts of Computers and to know about the elementary operations					
Total Instruction hours: 45					

Unit No.	Contents	Hours of instruction
I	**Introduction :** Introduction to computers-generation of modern computers-classification of digital computers-anatomy of a digital computer-memory units-auxiliary storage devices- input and output devices	9
II	Introduction to Computer Software -Introduction to Algorithm and Flowchart -Operating Systems - Introduction to Software Development – Data Processing.	9
III	Introduction to word processing - Microsoft word: format- table –mail-merge-macro-templates- symbol- drawing- introduction to presentation software- Microsoft power point- create, customize and show a presentation	10
IV	Introduction to electronic spreadsheet - Microsoft excel-formatting- function and formula- chart-pivot table- freeze pane-protect sheet- external data-sort and filter.	9
V	Internet and world wide web –e-mail –computers in office automation-computers as information tools for management controls.	8

Practical – 45 hrs	**Core Course -II –Practical – Office Automation Lab**	C0604
MS Word: format- mail merge- macros- template-table. **MS Excel:** format- formulas and functions- chart wizard- Working Pivot table. **MS PowerPoint:** Creating a PowerPoint presentation- Customizing your Presentation- Showing a Presentation.		
Text Books	1. Alexis Leon and Mathews Leon, "Introduction to Computers ", Leon Tech World, Chennai. 2. D.P. Nagpal, "Computer Course", S.Chand & Company Ltd. New Delhi.	
Reference Texts	1. E.Balagurusamy, "Fundamentals of Computers ", Tata McGraw Hill Ltd., New Delhi. 2. Taxali, "Pc Software for Windows made simple ", 1st Edition, 1998, Tata McGraw Hill Ltd., New Delhi. 3.Sanjay Sexena, " MS- Office 2000 for Everyone", 2002, Vikas Publishing House pvt ltd., Chennai	

Semester II –Core Course- IV

Course: B.Sc.	**Subject: Computer Science**		**Semester No.**	**II**	
Paper No**. Core Course- IV**			**Paper Code**	**C0605**	
Title of the Paper	**Programming in 'C'**		Marks for	Theory	Practical
Hours of Instruction Per week	Theory	3 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory- 3 hrs Practical- 3 hrs			Maximum Marks	100	100
Objectives	To learn the programming language C that is attractive, considerable worldwide and portable.				
Total Instruction hours: 45					

Unit No.	**Contents**	**Hours of Instruction**
I	C language fundamentals-character set- Identifiers and keywords-Data types- Declarations- expressions- Statements and symbolic constants, Input-Output: getchar, putchar, scanf, printf, gets, puts, functions, Preprocessor commands, #include, define, preparing and running a complete C program. Operators and expressions: arithmetic, Unary, Logical, bitwise, assignments and conditional operator, Library functions.	10
II	Control statements: While, do-while, statement, nested loop, if-else, switch, break, continue and goto statements, comma operator. Arrays: Defining and processing. Multi dimensional arrays. Strings and operation on strings.	10
III	Functions: Defining and accessing: Passing arguments, Function prototypes, Recursion. Use of library functions, storage classes: Automatic, external and static variables.	9
IV	Structure: Defining and processing- passing structure to function-union. Pointers: Pointers and arrays- pointers and string- pointer and function.	8
V	Simple file operations: The pointer as a file- low-level file operation-Random – access file operation.	8

Practical-45 hrs	**Core Course- IV– C Programming Lab** **SUB.CODE: C0606**
Implementation of: 1. Input/ output functions, 2. Control Functions, 3.Functions, 4.Arrays, 5.Pointers , 6.Structures and Unions, 7.Files	
Text Books	Introduction to "C" by E. Balaguruswamy.
Reference Text Books	The C Programming Language By Brian W.Kernighan and Dennis M.Ritchie Publishers: Prentice-Hall

Semester II – Core Course V

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**II**	
Paper No. **Core Course V**			Paper Code	CO607	
Title of the paper	**Computer Architecture & Introduction to Microprocessor**		Maximum Marks	Theory	Practical
Hours of instructions per	Theory	3 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 3 hrs, Practical – 3 hrs			Total	100	100
Objectives	To study and understand the functioning of Microprocessors				

Total Instruction hours: 45

Unit No.	Contents	Hours of Instruction
I	Data Representation: Fixed Point Representation – Floating Point Representation. Register Transfer and Micro operations: Register transfer language- Register transfer- Bus and memory transfer – Arithmetic micro	10
II	Basic Computer Organization and Design: Instruction Codes-Computer registers-computer instructions-Timing and Control-Instruction cycle-Memory-Reference Instructions-Input-Output and Interrupt-Design of Basic Computer- Design of Accumulator logic.	10
III	Micro programmed control: Control Memory - Address sequencing - Micro program Example - Design of control Unit. Central Processing Unit: Introduction – General Register organization - Stack organization.	9
IV	Internal architecture of 8085 Microprocessor – Functions of various block and signals – demultiplexing address and data bus – generating control signals. Detailed study of 8085 – addressing modes, Instructions, classifications and format, Types of instructions – arithmetic, logical, data transfer, branch, stack, I/O and machine control instructions	8
V	Assembly Language Programming in 8085 – Arithmetic operations – evaluation of simple arithmetic expression – Sorting of unsigned numbers – block operation – Code conversion – handling subroutines. Applications of microprocessor – A temperature monitoring System	8
	Core Course V- Practical– Microprocessor Lab - 45 hrs-	
1. Addition and subtraction 2. Multiplication and division 3. Sorting and searching		

Text Books	1. M. Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Prentice Hall. 2. Microprocessor Architecture, Programming and Applications by Ramesh S.Gaonkar, Wiley Eastern Limited. 3. Introduction to Microprocessor by A.P.Mathur, Tata McGraw Hill Publishing
Reference Text Books	1.Fundamentals of Microprocessors and Microcontrollers **by B. Ram,** Dhanpat Rai Publications 2.John P Hayes, " Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998

Semester II – Core Course VI

Course: B.Sc.	Subject: **Computer Science**		Semester No.	**II**	
Paper No. Core Course V**I**			Paper Code	**C0609**	
Title of the Paper	**Computer Algorithms**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	25	25
			ESE	75	75
Theory – 4 hrs			Total	100	100
Objectives	To learn about the different algorithms techniques.				
Total Instruction hours: 60					

Unit no.	**Contents**	**Hours of Instruction**
I	Introduction – What is an Algorithm? – Writing Structured Programs – Complexity of Algorithms - Analyzing Algorithms – Heaps and heap sort – Graphs – Hashing.	12
II	Divide and conquer: The general method – Binary search – Finding the maximum and minimum – Merge sort – Quick sort – Selection – Strassens 's matrix multiplication.	12
III	The Greedy method: The general method – Optimal storage on tapes – Knapsack problem – Job sequencing with deadlines – Optimal merge patterns – Minimum spanning trees.	12
IV	Backtracking: The general method – The n queen's problems – Sum of subsets – Graph coloring – Hamiltonian cycles – Knapsack problem.	12
V	Branch and Bound: The method - 0/1 Knapsack problem – Travelling salesman problem.(study the technique only, No Implementation part)	12

Text Books	Fundamental of Computer Algorithms by Ellis Horowitz and Sartaj Sahni, Galgotia Publications Pvt.Ltd.
Reference Text Books	Design and Analysis of Algorithms by Aho A.V. & Hopcraft .J.E.Addison Wessley.

Semester II – AECC – I - Environmental Science

Course: B.Sc.	Subject: **Computer Science**		Semester No:	II
Paper: **AECC – I - Environmental Science**			Paper Code	C0610
Title of the Paper	**Environmental Science**		Maximum Marks	100
Hours of instructions per Week	Theory	2 Credits	CIA	25
	Practical	--	ESE	75
Theory-2 hrs			Total	100
Objectives	To learn about the basic Environmental Science			

Total Instruction hours: 30

Unit No	Contents	Hours of instruction
I	Multidisciplinary nature of Environmental studies – Definition, scope and importance, Need for public awareness	2
II	Natural Resources Renewable & Non-Renewable resources: Natural Resources & associated problems. A) Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction , mining, dams & their effects on forest & tribal people. b) Water resources: Use & over-utilization of surface& ground water, floods, drought, conflicts over water, dams-benefits & problems. C) Mineral resources: Use and exploitation, Environmental effects of extracting and using mineral resources, Case studies. D) Food resources: World Food problems, changes caused by agriculture & overgrazing, effects of modern agriculture, fertilizer –pesticide problems, water logging, salinity, case studies. E) Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources, case studies, f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	8
III	Environmental Pollution – definition , cause, effects & control measures of : a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal Pollution g) Nuclear Hazards. Solid waste Management: Causes, effects & control measures of urban & industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone & landslides.	8
IV	Social Issues and the Environment – From Unsustainable to Sustainable Development – Urban problems related to energy. Water conservation, Rain water harvesting, and water shed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, Nuclear accidents and Holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environmental protection act. Air (prevention and control of pollution) act. Water (prevention and control of pollution) act. Wild life protection act. Forest conservation act. Issues involved in enforcement of environmental legislation. Public awareness	7
V	Human population and the environment. Population growth, variation among nations. Population explosion – family welfare programme. Environment and human health. Human rights. Value education. HIV/AIDS. Women and child welfare. Role of information technology in environment and human health. Case studies.	5

Text Books	Erach Bharucha "Text Book of environmental studies for undergraduate courses" – for UGC.

Semester III– Core Course - VII

Course: B.Sc	Subject: **Computer Science**		Semester No.	**III**	
Paper No. Core Course - **VI**			Paper Code	C0611	
Title of the Paper	**Data Structures**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 5,Practical - 3			Total	100	100
Objectives	To get a knowledge about the core programming aspects i.e. the data structure, and the various programming technologies used to apply these data structures				
Total Instruction hours:75					

Unit No.	Contents	Hours of Instruction
I	Introduction - How to create programs? - How to analyze program? – Representation of Arrays – ordered list – sparse matrices	15
II	Stacks & Queues -A mazing problems – evaluation of expressions – linked lists – singly linked lists – linked stacks and queues – polynomial additions.	15
III	More on linked lists: doubly linked lists and dynamic storage management – Garbage collection and compaction	15
IV	Trees –Basic Terminology – binary trees– binary trees representations - binary tree traversal – binary tree representation of trees – application of trees.	15
V	Graph -Terminology and Representation - Traversals, Connected components – Shortest paths –Topological Sort and Critical paths.	15

Text books	Fundamental of Computer Data structure by Ellis Horowitz and Sartaj Sahni, Galgotia Publications Pvt.Ltd.
Reference Books	Data Structures by Seymour Lipschutz, McGraw Hill Edition.

Core Course VII– Practical - Data Structure Lab	**45 hrs Sub.Code:C0612**
1. Searching techniques 2.Sorting techniques 3.Stacks using array 4.Queue using array 5. Polynomial addition using array	6. Linked lists 7. Linked stack 8. Linked queue 9.Doubly linked list 10. Tree traversals

Semester III – Core Course VIII

Course: B. Sc.	Subject: **Computer Science**		Semester No.	**III**	
Paper No**. Core Course VIII**			Paper Code	C0613	
Title of the Paper	**Object Oriented Programming in C++**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 5, Practical-3			Total	100	100
Objectives	To get an exposure to one of the latest programming technique- Object Oriented Programming.				
Total Instruction hours: 75					

Unit No.	**Contents**	**Hours of Instruction**
I	C++ programming basics, Loops and decisions: Relational operators, loops, decision, logical operators, precedence.	15
II	Structures, enumerated data types. Functions: Simple functions, passing argument to functions, returning values from functions, reference arguments, overloaded functions. Inline functions, variable and storage classes	15
III	Objects and classes: classes and Objects, Specifying the class, using the class, constructors, destructors, objects as function arguments, returning objects from function. Arrays: Arrays fundamentals, Arrays a class member data, Array of objects, Strings. Operator overloading: unary operator, overloading binary operators, Data conversion, Pitfalls of Operator overloading and conversion.	15
IV	Inheritance: Derived Base class, derived class constructors, overloading member functions, class hierarchies, public and private inheritance, levels of inheritance, multiple inheritance. Pointers: Address and pointers, pointers and arrays, pointer and functions, pointers and strings, Memory management, pointer to objects.	15
V	Virtual functions and other functions: Virtual functions, Friend functions, Static functions, this pointer. Files and Stream: String I/O, Object I/O, I/O with multiple objects, file pointer, disk I/O with member functions.	15

Text Books	1. Object – Oriented Programming in C++ by Robert Lafore, Galgotia Pub. 2. Object – Oriented Programming in C++ by E.Balagurusamy
References Text Books	C++ Primer Plus By Stephen Prata, Galgotia Pub.

Core Course VIII Practical – Object Oriented Programming in C++ Lab 45hrs- Sub.Code:C0614	
1. Programs using classes. 2. Implementing function Overloading 3 Implementation of Operator Overloading 4.Implementing multiple inheritance 5.Creation of virtual function	6.Implementation of Array of Objects 7. Implementation of Constructors and Destructors 8. Implementation of Pointers 9. String Handling 10. File handling

Semester III – Skill Enhancement Course (SEC-I)

Course: B.Sc	Subject: **Computer Science**		Semester No.	**III**
Paper No. **Skill Enhancement Course (SEC-I)**			Paper code	C0616
Title of the Paper	**RDBMS (MS Access)**		Maximum Marks	100
Hours of instruction per week	Theory	-	CIA	25
	Practical	2 credits	ESE	75
Practical – 3 hrs			Total	100
Objectives	To get an exposure to the database Concept.			

Total Instruction hours: 45 hrs

Unit No.	Contents	Hours of instruction & Practicals
I	Introduction-File system - Objective of Database System –Element of DBMS-Data models. MS Access basics – Opening an existing database-Creating a new table-Manipulating records in a table-modifying table –creating relationships-Editing the existing relationships.	15
II	Importing and Exporting information in and out of Access database. SQL Statement : Data Retrieval ,select , Data Definition language: CREATE, ALTER, DROP, RENAME, TRUNCATE - Data Manipulation Language: INSERT, UPDATE, DELETE, MERGE - Transactional Control statements : COMMIT, ROLLBACK, SAVE POINT	15
III	Query: Creating query in a design view-performing calculation-Using criteria (or) Advanced filters-Types of queries. Creating a Form based on multiple table –different controls – sub forms-Further enhancement in form design.	15

SEC –I - Ms Access lab

1. Design Student database.
2. Generating Employee Pay bill
3. Generating Electricity bill
4. Creating Library details
5. Preparing sales bill

Text Books	1.Database system concepts by Abraham Silberschatz 2. Step by step Microsoft Access 2003

Semester III –Skill Enhancement Course (SEC-I)

Course: B.Sc	Subject: **Computer Science**		Semester No.	**III**
Paper No. **SEC-I**			Paper code	
Title of the Paper	**VALUE EDUCATION**		Maximum Marks	100
Hours of instruction per week	Theory	2 credits	CIA	25
	Practical		ESE	75
Practical – 3 hrs			Total	100
Objectives	To get an exposure of Value Education.			
Total Instruction hours: 45				

Unit No.	Contents	Hours of instruction
I	**Philosophy of Life and Social Values -**Human Life on Earth (Kural 629) Purpose of Life (Kural 46) Meaning and Philosophy of Life (Kural 131, 226) Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).	9
II	**Human Rights**: Contemporary Challenges Child labour - Womens Right - Bonded labour - Problems of refugees - Capital punishment. National and State Human Rights Commissions.	9
III	**Social Evils**: Social Evils – Corruption, Cyber crime, Terrorism – Alcoholism, Drug addiction – Dowry – Domestic violence – untouchability – female infanticide – atrocities against women How to tackle them.	9

Text Books :	1. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613004. 2. Das, M.S. & Gupta, V.K. : Social Values among Young adults: A changing Scenario, M.D. Publications, New Delhi, 1995 3. For Life, For the future : Reserves and Remains – UNESCO Publication 4. Swami Vivekananda, Youth and Modern India, Ramakrishna Mission, Chennai.
Reference Books:	1. V.R. Krishna Iyer, Dialetics and Dynamics of Human Rights in India, Tagore Law Lectures. 2. Swami Vivekananda, Call to the Youth for Nation Building, Advaita Ashrama, Calcutta.

Semester III -Skill Enhancement Course - (SEC-I)

Course: B. Sc.	Subject: **Computer Science**		Semester No.	**III**	
Paper No**. SEC-I**			Paper Code		
Title of the Paper	**Introduction to Computer Hardware & Assembling**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	-	CIA	-	25
	Practical	2 Credits	ESE	-	75
Practical - 3 hrs			Total	-	100
Objectives	To get an exposure of Computer Hardware and Assembling.				

Total Instruction hours: 45

Unit No.	Contents	Hours of Instruction & Practicals
I	Introduction about Computer - Organization of computer- Software and hardware- Input/output devices: Basic networking concepts- Network topologies: LAN, WAN, MAN-Networking Model-The OSI model- TCP/ IP Model-Network adapters- Introducing protocols-Cabling and troubleshooting.	15
II	Introduction to various networking devices: Routers- Switches- Modems-Hubs-Wired and Wireless technology- Inside the PC: Opening the PC and identification-Study of different blocks, Assembling and disassembling.	15
III	Network basic and configuration: Setting IP addresses, Sharing files and folders-Network troubleshooting-PING test, ipconfig.	15

Text Books

1. Build your Own PC by Morris Rosenthal,McGrawHill , 2004.

Practical – SEC-I- Computer Hardware and Assembling

1. Motherboard
2. Expansion cards and slots
3. SMPS
4. Secondary storage and devices
5. Assembling a PC
6. Digital Computer system
7. Primary and Secondary memory
8. Central processing Unit
9. Different Cables
10. Networking hardware and File System

Semester IV- Core Course – X

Course: B.Sc	Subject: **Computer science**		Semester No.		**IV**
Paper No. **Core Course – X**			Paper Code :C0617		
Title of the Paper	**Database Management System**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	5 credits	CIA	25	--
	Practical	-	ESE	75	--
Theory - 5 hrs			Total	100	100
Objectives	To learn about the database management concepts and to get an exposure to the latest RDBMS concept				
Total Instruction hours: 75					

Unit No.	Contents	Hours
I	Introduction – Basic Terminology – Database Definition – Objective of Database- File systems versus Database systems – Entities and Attributes – Schemas and Sub-schemas – DBMS Architecture. [T2]	15
II	Data Models –Data Modeling using Entity–Relationship Model – Enhanced E-R Modeling. Relational data Model – Data Independence- Relational Algebra - Normalization – Different Normal Forms – Functional Dependencies. [T1]	20
III	SQL – SQL Statements – Data Definition Languages – CREATE, ALTER, DROP, RENAME, TRUNCATE, Data Manipulation Language: INSERT, UPDATE, DELETE. Data Control Language – GRANT, REVOKE, - Joins – Types of joins – Creating and manipulating views.- Transactional Control : COMMIT, ROLLBACK, SAVEPOINT. Constraints [R1]	15
IV	Indexing and Hashing : Single level and Multi-level Indexes – B+ tree Index Files – Static Hashing – Dynamic Hashing-Comparison of Ordered Indexing and Hashing – Multiple Key Access. [T1]	10
V	Concurrency Control – Time Stamp ordering – Validation Techniques – Recovery System –Log Based Recovery – Shadow Paging – Buffer Management [T1]	15
Text books	T1] Abraham Silverschatz, Henry F.Korth and S.Sudarshan "Database System Concepts", Fourth Edition, McGraw Hill, 2002. T2] James Martin "Computer Data-Base Organization" Second Edition, PHI.	
Reference text books	R1] Ramez Elmasri and Shamkant B.Navathe, "Fundamentals of Database Systems", Sixth Edition, Addison-Wesley .	

Semester IV – Core Course XI

Course: B.Sc.	Subject: **Computer Science**		Semester No.	**IV**	
Paper No. Core Course **XI**			Paper Code	**C0618**	
Title of the Paper	**Programming in Java**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 5 hrs Practical -3 hrs			Total	100	100
Objectives	To learn about the Java programming techniques				
Total Instruction hours: 75					

Unit no.	Contents	Hours
I	Java Features – comparison of Java with C and C++ - Java and Internet – Java Environment – Java Program structure – Java Tokens – Implementing a Java Program – Java Virtual Machine – Constants – Variables – Data types – Scope of Variables – Type casting – Operators and expressions – Decision Making, Branching and looping.	15
II	Defining a class – Constructors – Methods – Overloading - Static Members – Nesting Of Methods – Overriding Methods – Final Classes – Abstract Class – Visibility Control – Arrays – Creating an Array – Two Dimensional Arrays – Strings – String Arrays – String Methods – String Buffer Class – Vectors – Wrapper Classes.	15
III	Defining a subclass – Subclass Constructor – Multilevel Inheritance – Hierarchical Inheritance – Defining Interfaces – Extending Interfaces – Implementing Interfaces – Java API Packages – Creating A Package – Accessing And Using A Package – Adding A Class To A Package – Hiding Classes.	15
IV	Extending The Thread Class – Thread Life Cycle – Thread Exception – Thread Priority – Synchronization – Runnable Interface – Exceptions – Throwing Own Exceptions – Concept Of Streams Classes – Using Streams – Using File Class – Other Stream Classes.	15
V	Difference Between Application And Applets – Applet Life Cycle – Creating An Executable Applet – Designing A Web Page – Adding Applet To HTML File – Passing Parameters To Applets – Java Servlets.	15
Core Course XI Practical - Java Lab	**Sub.Code:C0619**	45 Hours

1. Substring removal from a string. Use string buffer class
2. Determining the order of numbers generated randomly using random class
3. Implementation of point class for image manipulation
4. Usage of calendar class and manipulation
5. String manipulation using char array
6. Database creation for storing e-mail addresses an manipulation
7. Implementing thread based applications & exception handling
8. Application using synchronization such as thread based, class based and synchronized statements
9. Working with frames and various controls
10. Implementation of Applet Programs
11. Working with colors and fonts
12. Simple programs using Servlets

Text books	E.Balaguruswamy," Programming with Java – A primer ", Second Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2002.
Reference Text Books	Herbert Schildt, "The Complete Reference – Java 2", Fifth Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2002.

Semester IV-Core Course XII

Course: B.Sc	Subject: **Computer Science**		Semester No.	**IV**	
Paper No. Core Course XII			Paper Code	C0620	
Title of the Paper	**Operating System**		Maximum Marks	Theory	Practical
Hours of instruction per week	Theory	4 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 5 hrs Practical - 3 hrs			Total	100	100
Objectives	To study about the functioning of the different modules of the OS				
Total Instruction hours: 75					

Unit No.	Contents	Hours of instruction
I	Operating System-Introduction-Basic concept and Terminology-An OS Resource Manager-OS process view point-OS hierarchical and extended machine view-Memory management: Single contiguous memory allocation-Introduction to multiprogramming.	15
II	Memory Management: Partitioned Allocation - Relocatable partitioned memory management-Paged memory management-Demand paged memory management-Segmented.	15
III	Job and Processor scheduling: Process control block-scheduling policies-scheduling algorithms: In non-multiprogramming environment-In multiprogramming environment.	15
IV	Process Synchronization: Race condition-Hardware solution to mutual exclusion problem: Test and Set instruction-Wait and Signal mechanism- semaphores. Deadlock: conditions-prevention-Banker's algorithm-Detection and Recovery.	15
V	Device Management: I/O device-device management functions-serial and direct access storage devices-Disk scheduling-File management: Functions – file organization-allocation methods.	15

Text Books	1.Operating System by Stuart E.Madnick and John Donovan Pub:Tata McGraw-Hill 2. Fundamentals of Operating System By Prof.R. Sriddhar Dynaram Publication-Bangalore Company.

Core Course XII Practical – OS Lab Sub.Code:C0621	45Hrs

1. Memory Allocation (Monoprogramming).
2. Memory Allocation (Multiprogramming).
3. Job Scheduling (Monoprogramming).
4. Job Scheduling (Multiprogramming).
5. Process Scheduling (Round Robin).
6. Process Synchronization.
7. Implementing Bankers Algorithm.
8. General file Management.

Semester IV – SEC-II-(Skill Enhancement Course)

Course: B.Sc.	Subject: **Computer Science**		Semester No:	IV
Paper: **SEC-II**			Paper Code	
Title of the Paper	**Introduction to DTP- PAGEMAKER**		Maximum Marks	100
Hours of instructions per Week	Theory	-	CIA	25
	Practical	2 credits	ESE	75
Practical – 3 Hrs			Total	100
Objectives	To develop the design skill in print publication using "Page Maker".			

Total Instruction hours: 45 hrs

Unit No	Contents	Hours of instruction & Practicals
I	Page Maker Basics – Working with a Publication – Text Tool – Importing Graphics.	15
II	Transformations: rotating, skewing & reflecting an object-grouping and ungrouping. Utilities: creating an adobe acrobat file-using the table editor – formatting text in a table.	15
III	Transformations: rotating, skewing & reflecting an object-grouping and ungrouping. Utilities: creating an adobe acrobat file-using the table editor – formatting text in a table.	15

Text Books:	Training guide - Adobe Pagemaker 6.5 – Shashank Jain & Satish Jain – BPB Publication

Practical	**SEC-IV – Introduction to DTP- PAGEMAKER**

1. Design a Newspaper article
2. Design an Advertisement.
3. Design an Invitation.
4. Design a Visiting card
5. Design a Brochure.

Semester IV – SEC-II (Skill Enhancement Course)

Course : B.Sc.	Subject: Computer Science		Semester No.	IV
Paper No. **SEC –II**			Paper Code	C0622
Title of the paper	**General Aptitude**		Maximum Marks	Theory
Hours of Instructions per week	Theory	2 credits	CIA	25
	Practical	-	ESE	75
Theory - 3 hrs Practical - -			Total	100
Objectives	To impart knowledge of Aptitude to the students.			
Total Instruction hours: 45				

Unit No.	Contents	Hours
I	**Basics:** Number Properties - LCM, HCF – Divisibility. **Arithmetic:** Fractions & Decimals - Ratio & Proportion - Square Roots - Simple & Compound Interest - Time & Speed - Time & Work – Percentage - Profit & Loss & Discount. **Sets:** Venn Diagrams.	15
II	**Algebra:** Polynomials – Linear Equations – Quadratic equations	15
III	**Mensuration:** Areas of Triangle – Quadrilateral – Circle - Volume of Cylinder, Cone and Sphere.	15
Text Book :	1. Quantitative Aptitude for Competitive Examinations by Dr. R.S. Aggarwal, S.Chand Publications. 2. How to Prepare for Quantitative Aptitude by Arun Sharma. McGraw-Hill Education.	

Semester – IV- SEC-II (Skill Enhancement Course)

Course: B.Sc.	Subject: Computer Science		Semester No:	IV
Paper: **SEC-II**			Paper Code	
Title of the Paper	**Introduction to Accounting Package – Tally**		Maximum Marks	100
Hours of instructions per Week	Theory	-	CIA	25
	Practical	2 credits	ESE	75
Theory - - Practical – 3 hrs			Total	100
Objectives	To impart the accounting knowledge using Tally.			
Total Instruction hours: 45 hrs				

Unit No	Contents	Hours of instruction
I	Starting Tally – Company Creation – Chart of Accounts – Accounts master – Voucher Entry – Single Mode Voucher Entry.	15
II	Trial Balance- Trading and Profit & Loss a/c and Balance Sheet – Income & Expenditure a/c – Data Maintenance.	15
III	Trial Balance- Trading and Profit & Loss a/c and Balance Sheet – Income & Expenditure a/c – Data Maintenance.	15

Text Books:	Text Book – Tally 9 by AK Nadhani & KK Nadhani.

Practical	**SEC-IV – Introduction to Accounting Package -Tally**

1 Study the Chart of Accounts.
2 Post journal Entry.
3 Prepare Trading & Profit & Loss Account.
4 Prepare Final Accounts
5 Prepare a Sales Invoice with Discount.
6 Prepare a sales Invoice with Sales Tax.

Semester V – Discipline Specific Elective (DSE)

Course: B.Sc	Subject: **Computer science**		Semester No.	**V**	
Paper No. **DSE**			Paper Code		
Title of the Paper	**C# and .NET FRAMEWORK**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 credits	CIA	25	25
	Practical	2 credits	ESE	75	75
Theory - 5 hrs Practical – 3 hrs			Total	100	100
Objectives	To learn about Dot Net concepts and to get an exposure of **C#.**				
Total Instruction hours: 75					

Unit No.	Contents	Hours
I	Introduction to the .NET Platform - Common Language Runtime (CLR) The Common Type Specification (CTS) The Common Language Specifications (CLS) Assemblies - .NET Base Classes CLR Debugger.	15
II	Introduction to C# - Data Type Operators Flow Control and Iteration Arrays and Strings Basics of C# Classes Boxing and Unboxing Reflection Interoperability The Preprocessors Attributes Name Spaces.	20
III	Object-Oriented Programming in C# - Encapsulation, Inheritance, and Polymorphism Exception Handling Garbage Collection Input and Output (Directories, Files, and Streams).	15
IV	Implementing the IC1oneable and IComparable Interfaces Introduction to .NET Collections (including Custom Collections) Custom Indexers, Delegates and Events Multithreading and Synchronization Type Reflection and Attributes Programming the Windows Registry.	10
V	ADO.NET for Database Programming with Datasets and Object Model. Windows Applications: Winforms Winforms Namespace Creating Winforms Applications in VS.NET Developing Windows Applications.	15
Text books	1. Robert J.Oberg, Introduction to C# using .NET, PHI, 2002. 2. Andrew Troelsen, C# and .NET Platform, Apress, 1st edition, 2001. 3. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2002.	
Reference Books	1. Ben Albahari, Peter Drayton and Brad Merrill, C# Essentials, SPD, 2001. 2. Microsoft C# Language Specifications , WP Publishers and Distributors Pvt.Ltd.,2001	

Practical - Discipline Specific Elective C# — 45 hrs

1. Implement Classes and Objects, Inheritance & Polymorphism
2. Implement Interfaces, Operator Overloading, Delegates and Events
3. Implement Exception Handling & Multi-Threading
4. Create Console application & Window Applications.
5. Create programs using SDI & MDI
7. Create program using Database Controls
8. Develop any TWO case studies listed below:

I. Inventory Control
II. Retail Shop Management
III. Employee Information System
IV. Personal Assistant Program
V. Students' Information System

Semester V – Discipline Specific Elective (DSE)

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**V**
Paper No. **DSE**			Paper Code	
Title of the paper	**Computer Graphics**		Maximum Marks	Theory
Hours of instructions per week	Theory	5 Credits	CIA	25
	Practical	-	ESE	75
Theory – 5 hrs Practical –			Total	100
Objectives	To learn about the Computer Graphics Techniques.			
Total Instruction hours: 75				

Unit No.	Contents	Hours of Instruction
I	OVERVIEW OF COMPUTER GRAPHICS SYSTEM: View of Computer Graphics System-Video display devices Raster Scan and random scan system- Input devices-Hard copy devices.	15
II	OUTPUT PRIMITIVES AND ATTRIBUTES: Drawing line, circle and ellipse generating algorithms-Scan line algorithm-Character generation-Attributes of lines, curves, and Characters-Ant aliasing.	15
III	TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING: Two dimensional Geometric Transformations-Windowing and Clipping of polygons.	15
IV	THREE DIMENSIONAL GRAPHICS AND VIEWING: Three-dimensional concepts-Object representations: Polygon surfaces, Quadric surfaces, Spline representation, Bezier curves, Geometric and Modeling	15
V	REMOVAL OF HIDDEN SURFACES: Visible Surface Detection Methods_ Computer Animation.	15
Text books	Hearn, D. and Pauline Baker, M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, Delhi, 1997.	
Reference Text Books	1.Neumann, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Book Co., 1979. 2.Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985. 3.Asthma, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P)Ltd., Publishers, 1996. 4.Floey,J.d., Van Dam,A, Feiner,S. k and Hughes,J.F, Computer Graphics, Pearson Education, New Delhi,2001.	

Semester V – Discipline Specific Elective (DSE)

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**V**	
Paper No. **DSE**			Paper Code		
Title of the paper	**Web Technology**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 credits	CIA	25	25
	Practical	2 credits	ESE	75	75
Theory – 5 hrs Practical – 3 hrs			Total	100	100
Objectives	To enable the students to learn the latest web programming technique Web Applications Development.				

Total Instruction hours: 75

Unit	Contents	Hours
I	Introduction to internet – resource of internet H/W & S/W requirements of internet – Domain naming system registering our domain name – URL protocol server name port relative URLs overview of web browsers – ISDN dialup of leased line connection - internet service providers – internet services protocols concepts, internet client and internet servers, introduction to TCP / IP FTP SMTP POP3(Brief treatment)	15
II	Introduction to HTML – elementary tags in HTML – list in HTML - displaying text in lists – using ordered lists – using unordered lists – directory list. Definition lists – combining list types graphics and image formats – graphics and HTML documents .Images and Hyperlink anchors – image maps – tables – frames – forms – background graphics and color. Introduction to style sheets.	15
III	Overview of Java Scripting language – Data Types – Variables – Methods – Control structure – Using java Script for Validations – Event handling.	15
IV	Overview of ASP.NET – Standard ASP.NET Namespaces – Web Controls and Server Controls – The structure of an ASP.NET Page – Building Forms with Web Server Control.	15
V	Database Processing with ASP.NET – Database Access with ADO.NET – Binding Data to Web Controls – Using the DataList and DataGrid Controls.	15
Discipline Specific Elective Paper– Web Design Lab		45 Hours

1.Create a simple page HTML Page 2. Create a Table in a web page
3. Design a web page using Frames 4. Design an interactive web page using Java Script
5. Design an input screen with validation using Java Script.
6. Design a simple calculator using ASP.NET
7. Design a web page with various web controls
8. Design a web page with various server controls
9. Design a web site for payroll using ADO.NET
10. Design a web page using DataList and DataGrid Control.

Textbooks	1.HTML 4.0 source book 2.Learning to use Internet:Ackermann 3.Web Technology:N.P. Gopalan and J. Akilandeswari 4. ASP.NET Unleashed : Stephen Walther

Semester V- Discipline Specific Elective (DSE)

Course: B.Sc.	Subject: **Computer Science**		Semester No.	**V**	
Paper No. **DSE**			Paper Code		
Title of the Paper	**Cloud Computing**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	5 Credits	CIA	25	-
	Practical	-	ESE	75	-
Theory – 5 hrs			Total	100	-
1Objectives	To learn about the cloud computing techniques.				

Total Instruction hours: 75

Unit no.	Contents	Hours of instruction
I	Cloud Computing Foundation : Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing	15
II	Cloud Computing Architecture : Cloud Computing Technology – Cloud Architecture – Cloud Modeling and Design - Virtualization : Foundation – Grid, Cloud and Virtualization – Virtualization and Cloud Computing	15
III	Data Storage and Cloud Computing : Data Storage – Cloud Storage – Cloud Storage from LANs to WANs – Cloud Computing Services : Cloud Services – Cloud Computing at Work	15
IV	Cloud Computing and Security : Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services – Cloud Computing Tools : Tools and Technologies for Cloud – Cloud Mashaps – Apache Hadoop – Cloud Tools	15
V	Cloud Applications – Moving Applications to the Cloud – Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications.	15

Text Book	1. Cloud Computing – A Practical Approach for Learning and Implementation, A.Srinivasan and J.Suresh, Pearson India Publications, 2014
Reference Book	1. Cloud Computing: Principles and Paradigms, edited by RajkumarBuyya, James Broberg, Andrzej, Wiley India Publications,2011

Semester V- Discipline Specific Elective (DSE)

Course:B.Sc	Subject: **Computer Science**		Semester No.	V
Paper No. **DSE**			Paper Code	
Title of the Paper	**Software Engineering**		Maximum Mark	100
Hours of instruction per week	Theory	5 credits	CIA	25
	Practical	--	ESE	75
Theory - 5 hrs			Total	100
Objectives	To educate the student about the concept design of projects and to get an overall idea about the different software engineering techniques.			
Total Instruction hours: 75				

Unit No.	Contents	Hours of instruction
I	Introduction to software engineering: some definitions – some size factors –quality and productivity factors – managerial issues. Planning a software project: Defining the problem – developing a solution strategy – planning the development process – planning an organizational structure – other planning activities	15
II	Software Cost Estimation: software cost factors – software cost estimation techniques - staffing level estimation– estimating software maintenance costs.	15
III	Software Requirements Definition: The software requirements specification – formal specification techniques-languages and processors for requirements. Software Design: Fundamental design concepts – modules and modularization criteria.	15
IV	Software Design: design notations – design techniques – detailed design considerations – Real-Time and distributed system design-test plan – milestones, walkthroughs and inspections – design guidelines Software Implementation: Structured coding techniques – coding style – standards and guidelines – documentation guidelines	15
V	Verification and validation Techniques: quality assurance-walkthroughs and inspections – static analysis – symbolic execution-unit testing and debugging- formal verification. Software Maintenance: Enhancing maintainability during development – managerial aspects of software engineering – configuration management – source code metrics – other maintenance tools and techniques.	15
Text book	Software Engineering Concepts – Richard E. Fairley, Tata McGraw Hill Publishing Company Ltd, New Delhi	
Reference books	Pressman R.S.., Software Engineering, Tata McGraw Hill Pub. Co, New Delhi, 2000. Somerville, "Software Engineering", Pearson Education, New Delhi, 2000.	

Semester V- Discipline Specific Elective (DSE)

Course: B. Sc.	Subject: **Computer Science**		Semester No.	**VI**
Paper No**. DSE**			Paper Code	
Title of the Paper	**Data Mining And Warehousing**		Maximum Marks	100
Hours of instructions per week	Theory	5 Credits	CIA	25
	Practical	---	ESE	75
Theory – 6 hrs			Total	100
Objectives	To get an exposure to one of the latest technique. Data Mining and Warehousing.			

Total Instruction hours: 75

Unit No.	Contents	Hours of instruction
I	**INTRODUCTION:** What is a data Warehouse? **DELIVERY PROCESS:** Data warehouse delivery method **SYSTEM PROCESSES:** Introduction – Overview – Typical process flow within a data warehouse – Extract and load process – Clean and transform data – Backup and archive process – Query management process. **PROCESS ARCHITECTURE:** Introduction – Load manager – Warehouse manager – Query manager.	15
II	**SYSTEM AND DATA WARE HOUSE PROCESS MANAGERS** Introduction – Why you need tools to manage a data warehouse – system managers – Data warehouse process managers – Load manager – Warehouse manager – Query manager **CAPACITY PLANNING, TUNING AND TESTING** Introduction – Process – Estimating the load **TUNING THE DATA WAREHOUSE** Introduction – Assessing performance – Tuning the data load – Tuning queries	15
III	**INTRODUCTION**– Basics of Data Mining – Data Mining Versus Knowledge Discovery in Database – Data Mining Issues – Data Mining Metrics – Social Implications of Data Mining – Data Mining from a Database Perspective.	15
IV	**RELATED CONCEPTS-** Database/OLTP Systems – Fuzzy Sets and Fuzzy Logic – Information Retrieval – Decision Support Systems – Dimensional Modeling – OLAP – Web Search Engines **DATA MINING TECHNIQUES** Introduction – A Statistical Perspective on Data Mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms	15
V	**ASSOCIATION RULES** Introduction – Large Item sets – Basic Algorithms – Parallel and Distributed Algorithms –Comparing Approaches – Incremental Rules – Advanced Association Rule Techniques – Measuring the Quality of Rule Techniques – Measuring the Quality of Rules	15

Text Books	1. Data Warehousing In The Real World, Sam Anahory, Dennis Murray, Pearson Education [LPE] ,Thirteenth Indian Reprint, 2005. 2. Data Mining Introductory And Advanced Topics, Margaret H.Dunham, Pearson Education [LPE] First Impression, 2006.
References Text Books	1. Insight into Data Mining Theory and Practice by K.P.Soman Shyam Diwakar V.Vijay PHI Publication 2. Data Warehousing, Data Mining and Olap By Alex Berson And Stephen J.Smith TMH Publication.

Semester – V- SEC-III (Skill Enhancement Course)

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**V**
Paper No. **SEC –III**			Paper Code	
Title of the paper	**Introduction to DTP Using Photoshop**		Maximum Marks	Theory
Hours of instructions per week	Theory	-	CIA	25
	Practical	2 credits	ESE	75
Theory - - Practical - 4 hrs			Total	100
Objectives	To develop the design and editing skill in print publication using "Photoshop".			

Total Instruction hours: 60

Unit No.	Contents	Hours
I	Introduction to DTP- General design consideration-Text organization-Design Common Media Publication. Starting Photoshop-CS2: Program window - screen mode –opening, creating, saving, reverting, closing file.	20
II	Working with Images: Vector and bitmap images - Image size - Image resolution - Editing images. Making Editing – Filling – Transformation selection.	20
III	Layers: Layers palette – Creating – Hiding – Showing – Repositioning – Merging layers. Image Import & Export.	20
Text Book:	Comdex DTP – Course kit - Vikas Gupta – Dreamtech Press.	
Reference Book:	The Essential Photoshop 5 – Eileen Mullin- PHI.	

Practical	**SEC-II – Introduction to DTP-Photoshop**

1. Design a News Paper article.
2. Design an Advertisement.
3. Design an Invitation.
4. Design a Visiting card.
5. Design a Birthday Card using layers.

Semester – V - SEC-III (Skill Enhancement Course)

Course: B. Sc.	Subject: **Computer Science**		Semester No.	V
Paper No. **SEC-III**			Paper Code	
Title of the Paper	**PYTHON Programming**		Maximum Marks	100
Hours of instructions per week	Theory	-	CIA	25
	Practical	2 credits	ESE	75
Practical – 3 hrs			Total	100
Objectives	To obtain the basic knowledge of Python programming.			
Total Instruction hours: 45 hrs				

Unit No.	Contents	Hours of Instruction
I	Introduction to python- Environment Setup-Basic Syntax- Variable Types-Basic Operators.	15
II	Decision Making Statements- Loops-Numbers-Strings-List-Tuples-Dictionary.	15
III	Functions- Files I/O-Modules-Exception- Classes and Methods.	15

Text Books	Ljubomir Perkovic, "Introduction to Computing Using Python: An Application Development Focus", John Wiley & Sons, 2012
Reference	1. T. Budd, Exploring Python, TMH, 1st Ed, 2011 2. Python Tutorial/Documentation www.python.org

PYTHON LAB - LIST OF EXERCISES

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
Grade A: Percentage >=80
Grade B: Percentage>=70 and <80
Grade C: Percentage>=60 and <70
Grade D: Percentage>=40 and <60
Grade E: Percentage<40
3. Program using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number.
6. Program to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!
7. Program to calculate the sum and product of two compatible matrices.

Semester V **– SEC-III (Skill Enhancement Course)**

Course: B.Sc.	Subject: **Computer Science**		Semester No:	V
Paper: **SEC III**			Paper Code	
Title of the Paper	**Android Programming**		Maximum Marks	100
Hours of instructions per Week	Theory	2 credits	CIA	25
	Practical	-	ESE	75
Practical – 4 hrs			Total	100
Objectives	To obtain the basic knowledge of Android programming.			
Total Instruction hours: 60 hrs				

Unit No	Contents	Hours
I	Introduction - Android - Android Versions - Features of Android - Architecture of Android - Obtaining the Required Tools - Android SDK - Installing the Android SDK Tools - Configuring the Android SDK Manager – Eclipse - Android Development Tools (ADT) - Creating Android Virtual Devices (AVDs) - Types of Android Application - Anatomy of an Android Application – Activities.	20
II	Linking Activities Using Intents – Resolving Intent Filter Collision – Returning Results from an Intent - Passing Data Using an Intent Object - Adding Fragments Dynamically - Life Cycle of a Fragment - Interactions between Fragments	20
III	Understanding the Intent Object - Using Intent Filters – Adding Categories - Displaying Notifications - Android User Interface - Understanding the Components of a Screen - Adapting to Display Orientation - Managing Changes to Screen Orientation- Utilizing the Action Bar - Creating the User Interface Programmatically – Listening for UI Notifications - Designing Your User Interface with Views - Using Basic Views- Using Picker Views - Using List Views to Display Long Lists	20

Text Books:	1. Wei - Meng Lee, "Beginning Android Application Development", 2nd edition, John Wiley,2012. 2. Reto Meier, "Android 6 for Programmers: An App-driven Approach", 3rd edition, Pearson Education, 2016. 3. Deital & Deital, "Android for Programmers: An App-Driven Approach", 1st edition, Pearson Education, 2012.

ANDROID PROGRAMMING LAB - LIST OF EXERCISES

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi-threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.

Semester VI – Ability Enhancement Compulsory Course (AECC)-II

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**V**	
Paper No. **AECC-II**			Paper Code		
Title of the paper	**Public Administration**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	2 Credits	CIA	25	25
	Practical	--	ESE	75	75
Theory – 3 hrs Practical-			Total	100	100
Objectives	To help the student to get knowledge about the Public administration System in India.				
Total Instruction hours: 45					

Unit No.	Contents	Hours
I	Introduction: Meaning, nature and Scope of Public Administration and its relationship with other disciplines- Evolution of Public Administration as a discipline – Woodrow Wilson, Henry Fayol , Max Weber and others - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto	10
II	Public Administration in India Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -– All India Services – Training of Civil Servants – UPSC – Niti Ayog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women's Commission –CAG	10
III	State and Union Territory Administration Differential Administrative systems in Union Territories compared to States Organization of Secretariat: -Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration – Position of Lt.Governor in UT – Government of Union Territories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island	15
IV	4. Emerging Issues in Indian Public Administration Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Reddressal mechanisms –– The RTI Act 2005 – Social Auditing and Decentralization – Public Private partnership -	10
Reference Books	1. A. R. Tyagi, Public Administration, Atma ram sons, New Delhi, 1983. 2. Appleby P.H, Policy and Administration, The University of Alabama Press, Alabama, 1949. 3. Avasthi and Maheswari,Public Administration in India,Agra:Lakshmi Narain Agarwal, 2013 4. Gerald.E. Caden. Public Administration. Pablidas Publishers, California, 1982.	
Reference Sites	1. http://cic.gov.in/ 2. http://www.mha.nic.in/ 3. http://rti.gov.in/ 4. http://www.cvc.nic.in/	

Semester VI - Discipline Specific Elective (DSE)

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**VI**	
Paper No. **DSE**			Paper Code		
Title of the paper	**Computer Networks**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	25	25
	Practical	2 Credits	ESE	75	75
Theory – 5 hrs Practical- 4 hrs			Total	100	100
Objectives	To help the student to get knowledge about the Networking aspects of computer.				
Total Instruction hours: 75					

Unit	Contents	Hours
I	Introduction – Uses of computer Networks – Network hardware – Network software – Reference Model- The OSI Reference model, TCP/IP Reference Model, and A Comparison of the OSI and TCP Reference models – Example Networks – Novell networks. The ARPANET and the Internet	15
II	The physical layer – Guided Transmission media – Wireless transmission – Communication satellites- The public switched telephone network-Mobile telephone system. Data link layer – Design issues – Error Detection and Correction – Elementary data link protocols – Example data link protocols – Sliding window protocols.	15
III	The medium access sub layer – The channel allocation problem – Multiple access protocols – Aloha. Carrier sense multiple access protocols, Collision protocols – ETHERNET-Wireless LAN's-802.1 –Broadband wireless-802.16, and Data Link layer switching-Repeaters, Hubs, Bridges, Switches, Routers and Gateways.	15
IV	The Network layer – Network layer design issues – Routing algorithms – Shortest path routing, Flooding, Flow based routing, Hierarchical routing, Broadcasting routing – Congestion control algorithms – General principle of Congestion algorithms, Congestion prevention policies, Internet working – The Network layer in the internet-IP protocol, IP addressing, Internet multicasting-Mobile IP.	15
V	The Transport layer- Transport service – Elements of transport protocols – Internet transport protocol-UDP, Remote procedure call, TCP,TCP connection management, Wireless TCP and UDP. The Application layer – Domain name system-Electronic mail-WWW-Network Security –Cryptography - Introduction, Substitution ciphers-Transposition ciphers-fundamental cryptographic principals-e-mail security- PGP – PEM –S/MIME.	15
Text Books	Computer Networks – Andrew S. Tanenbaum, PHI. Fourth edition	
Reference Book	Introduction to Data Communication and Networking – Behrouz and Forouzan – Second Edition – TMH 2001.	

Discipline Specific Elective Paper Practical - Networks Lab	60 Hours
1.Configuring IP address 2.Configuring Network host-Setting host name and assigning IP address 3.Imlementation of FTP 4.Basic chat Application 5.Client-Server Application	

Semester VI- Discipline Specific Elective (DSE)

Course: B.Sc	Subject: **Computer Science**		Semester No:	VI
Paper No. **DSE**			Paper code	
Title of the paper	**Artificial Intelligence**		Maximum marks	100
Hours of the Instructions Per week	Theory	5 credits	CIA	25
	Practical	--	ESE	75
Theory – 6 hrs			Total	100
Objectives	To learn about the Various AI Techniques			
Total Instruction hours: 75				

Unit	Contents	Hours of Instruction
I	What is Artificial Intelligence- A definition- Underlying Assumption- A.I. Technique – TIC-TAC-Toe-Problems? **Problem Spaces and Search**: Defining the problem as state space search- Production systems – Control Strategies – Heuristic search – Problem characteristics – Production system characteristics.	15
II	**Heuristic search Techniques**: Generate and test – Hill climbing – Best – first search – Problem reduction. **Knowledge representation issues:** Representation and Mappings – Approaches to Knowledge representation.	75
III	**Predicate logic**: Representing simple facts in logic – representing Instance and Is a relationship – Computable functions and Predicate – Resolution.	75
IV	**Game playing**: the mini max search Procedure – Adding Alpha – Beta cutoffs. **Planning**: Overview – An example Domain: The Blocks world – Components of a planning –Goal stack planning.	75
V	**Expert Systems** – definitions of Expert Systems – Characteristics of an Expert Systems –Architecture of Expert Systems – role of expert system knowledge acquisition – advantages and limitation of expert system – example of expert systems: MYCIN	75
Text books	Artificial Intelligence - By Elaine Rich, Kevin Knight. Shivashakar B Nair (Publisher: McGraw –Hill edition)	
Reference Books	1. Foundations of Artificial intelligence and expert systems By V.S. janakiraman, K.Sarukesi, Gopalkrishnan.P(Publishers: Macmillan Series) 2. Artificial Intelligent By Dr .P. Rizwan Ahmed (Margham Publisher)	

Semester VI – Discipline Specific Elective (DSE)

Course: B. Sc.	Subject: **Computer Science**		Semester No.	**VI**	
Paper No**. DSE**			Paper Code		
Title of the Paper	**Advanced Java Programming**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	4 Credits	CIA	75	75
	Practical	2 Credits	ESE	25	25
Theory –5 hrs Practical- 4 hrs			Total	100	100
Objectives	To get an exposure to Advanced Java Programming.				

Total Instruction hours: 75

Unit	Contents	Hours of instruction
I	**Input / Output:** The Java I/O classes and Interfaces – File – The Stream Classes – The Byte Streams – The Character Streams – Using Stream I/O – RMI.	15
II	**Event Handling:** The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces– Using the Delegation Event Model – Adapter classes – Inner classes. **Swing:** JApplet – Icons and Labels – Text fields – Buttons – Combo boxes – Tabbed panes – Scroll panes – Trees – Tables.	15
III	**AWT Controls, Layout Managers, and Menus:** Control Fundamentals – Labels – Using Buttons – Applying Check Boxes – CheckboxGroup– Choice controls – Using Lists – Managing Scroll Bars – Using a TextField – Using a TextArea – Layout Managers – Menu Bars and Menus – Dialog Boxes – FileDialog.	15
IV	**Networking:** Networking Basics – Java and the Net – InetAddress – TCP/IP client Sockets – URL – URL Connection – TCP/IP Server sockets – Datagrams.	15
V	**Java Beans:** Advantages – BDK – JAR Files – Introspection – Developing a simple Bean Using the BDK– Using Bound Propertie3s – Using the Bean Info Interface – persistence – Customizes – Java Beans API – Using Bean Builder. **Servlets:** The Life Cycle of a Servlet – Simple Servlet – The Servlet API – The javax.servlet package – Reading Servlet Parameters – The javax.Servlet.http package – Handling HTTP Requests and Responses – Using cookies – Session Tracking.	15

Text Books	1."**Java 2 – The complete Reference**", Fifth Edition 2006, **Herbert Schildt**, Tata McGraw – Hill Publishing Company Limited, New Delhi.
References Text Books	1. **"Java-How to Program**" Sixth Edition 2005**, H.M. Deitel, P.J. Deitel**, Pearson Education Pte. Ltd, Delhi.

Practical – 60 hrs **DSE -Advanced Java Programming**

1) Inheritance and Polymorphism 2) Packages and interfaces 3) Exception Handling 4) Threading and Multithreading 5) Streams and String Classes 6) Applet, layouts and AWT Components 7) Swing components.	8) Util packages 9) Servlets and JSP 10) Session Tracking 11) Cookies. 12) Java Bean components 13)Applications in RMI 14) Connecting Servlet, RMI database using JDBC

Semester VI – Discipline Specific Elective (DSE)

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**VI**	
Paper No. **DSE**			Paper Code		
Title of the paper	**Mobile Computing**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	5 credits	CIA	25	-
	Practical	--	ESE	75	-
Theory –5 Hrs			Total	100	-
Objectives	To enable the students to learn the latest mobile technologies in the field of networking.				

Total Instruction hours: 75		
Unit No.	Contents	Hours of instruction
I	**Introduction** – Applications - Mobile and wireless devices - Simplified reference Model - Need for mobile computing - Wireless transmission: Frequencies for radio transmission - Multiplexing - Spread spectrum - Cellular systems.	15
II	**Medium access control:** Motivation for a specialized MAC – SDMA – FDMA – TDMA – CDMA.	15
III	**Telecommunication systems** : **GSM** – System architecture – Radio interface – Protocols – Handover – Security **– DECT** : - System architecture – Protocol architecture.	15
IV	**Wireless LAN**: Infrared Vs Radio transmission – infrastructure and ad-hoc network- **Bluetooth**: - Architecture – User scenarios –Radio layer – Baseband layer. **Mobile Network Layer**: Mobile IP – Mobile ad-hoc network	15
V	**Mobile transport layer**: Traditional TCP – Classical TCP improvement – TCP over 2.5/3G Wireless network – Performance enhancing proxies. **Wireless application Protocol**: WAP – Architecture-WML-WML Script.	15
Textbook	Mobile communications – Jochen H. Schiller – Second Edition-Pearson Publication Limited	
References	1. The Wireless application Protocol: Writing applications for Mobile Internet – Sandeep Singhal. 2. Mobile computing – Dr. L.Jabasheela – Lakshmi Publications.	

Semester VI – Discipline Specific Elective (DSE)

Course: B. Sc.	Subject: **Computer Science**		Semester No.	**VI**
Paper No**. Discipline Specific Elective (DSE)**			Paper Code	
Title of the paper	**a)Basics of Cyber Security**		Maximum Marks	100
Hours of instructions per week	Theory	5	CIA	25
	Practical	--	ESE	75
Theory- 5 Hrs			Total	100
Objectives	To learn about the Basics of Cyber Security			
Total Instruction hours:75				

Unit No.	Contents	Hours of instruction
I	Introduction Computer Networks- Computer and Network Peripherals-Internet Basics-Search Engine- Web Browsers.	15
II	Importance of Cyber Security- Computer Ethics- Threats (Virus, Worms, Trojan, Malware, Ransom ware, Identity Theft)-Torrent and infected sites.	15
III	Data security- Mobile Device Security- User Security- File Security-Password Security-Encryption-Decryption- Firewall- Configure firewall-Antivirus-Cyber Security Policies.	15
IV	Email Usage- Best Practices-Spam Filter- Safe Downloading- Online Banking-Online Shopping- Social Engineering-Phishing.	15
V	Secure Web Browser-Unsecured Wi-Fi- Risks of unsecured Wi-Fi – Blue Tooth Security-Introduction to Parental Control.	15
Text Book	Chuck Eastton " Cyber Security Fundamentals", Pearson Second Edition.	
Reference Text Books	James Graham, Richard Howard, Ryan Olson, "Cyber security Essentials", CRC Press.	

Semester VI – Discipline Specific Elective (DSE)

Course:B.Sc	Subject: **Computer Science**		Semester No.	VI
Paper No. **Discipline Specific Elective (DSE)**			Paper Code	
Title of the Paper	**E-Commerce**		Maximum Mark	100
Hours of instruction per week	Theory	5	CIA	25
	Practical	--	ESE	75
Theory-5 Hrs			Total	100
Objectives	To educate the student about the technology aspects of Electronic Commerce and to provide the basic building blocks for E-Commerce implementation.			
Total Instruction hours: 75				

Unit	Contents	Hours of instruction
I	Electronice Commerce Environment and opportunities: Background – The Electronic Commerce Environment – Electronic Marketplace Technologies – Modes of Electronic Commerce Overview – Electronic Data Interchange – Migration to Open EDI – Electronic Commerce with WWW/Internet – Commerce Net Advocacy – Web Commerce going forward.	15
II	Approaches to safe Electronic Commerce : Overview – secure Transport Protocols – Secure Transactions – Secure Electronic Payment Protocol (SEPP) – Secure Electronic Transaction (SET) – Certificates for Authentication – Security on Web Servers and Enterprise Networks – Electronic cash and Electronic payment schemes: Internet Monetary payment and Security requirements – payment and purchase order process – Online Electronic cash.	15
III	Internet/Intranet Security issues and solutions: The need for Computer Security – Specific Intruder Approaches – Security strategies – Security tools – Encryption – Enterprise Networking and Access to the Internet - Antivirus programs – Securijty Teams.	15
IV	MasterCard/Visa secure Electronic Transaction: Introduction – Business Requirements – Concepts – Payment processing – E-mail and secure e-mail technologies for electronic commerce: Introduction – The Mean of Distribution – A model for message handling - How does e-mail work? MIME: Multipurpose Internet Mail Extensions – S/MIME : Secure Multipurpose Internet Mail Extensions – MOSS : Message Object Security Services.	15
V	Internet and Web site establishment: Introduction – Technologies for Web servers – Internet tools relevant to Commerce – Internet Applications for Commerce – Internet charges – Internet Access and Architecture – Searching the Internet.	15
Text books	1. Daniel Minoli & Emma Minoli, "Web Commerce Technology Handbook", TataMcGraw-Hill, 1999. 2. K.Bajaj & D.Nag, "E-Commerce", TataMcGraw-Hill,1999.	

Semester VI – Discipline Specific Elective (DSE)

PROJECT WORK

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

A student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

Semester VI – Discipline Specific Elective (DSE)

Course : B.Sc.	Subject: **Computer Science**		Semester No.	**VI**	
Paper No. **DSE**			Paper Code		
Title of the paper	**Project Work**		Maximum Marks	Project	
Hours of instructions per week	Theory	5 credits	CIA	50	-
	Practical	--	ESE	50	-
Project – 12 Hrs			Total	100	-
Objectives	The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.				

Semester VI – **SEC-IV (Skill Enhancement Course)**

Course: B.Sc.	Subject: **Computer Science**		Semester No:	VI
Paper: **SEC-IV**			Paper Code	
Title of the Paper	**PHP Programming**		Maximum Marks	100
Hours of instructions per Week	Theory	-	CIA	25
	Practical	2 Credits	ESE	75
Theory - -- Practical – 4 Hrs			Total	100
Objectives	**To obtain the basic knowledge of PHP programming**			

Total Instruction hours: 60 hrs

Unit No	Contents	Hours of instruction
I	**Introduction to PHP:** PHP Introduction- Environment Setup and Software Requirements-Syntax-Variables-Constants-Operators.	20
II	**PHP Statements**-Decision Making Statements-Loop Statements-Arrays-Strings	20
III	**PHP and HTML**- Forms-Capturing Form Data-GET-POST Methods-Request Variable-Files I/O-Functions-Cookies-sessions. Introduction – PHP and MYSQL-PHP and AJAX	20

Text Books:	PHP A Beginner's Guide —, VIKRAM VASWANI, Tata McGraw-Hill
Reference book:	1. The PHP Complete Reference – Steven Holzner – Tata McGraw-Hill Edition. 2. Spring into PHP5 – Steven Holzer, Tata McCraw Hill Edition

Practical	**SEC-IV - PHP Programming**	

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.
Sample string : 'The quick " " brown fox'
Expected Output : Thequick""brownfox
9. Write a PHP script that finds out the sum of first n odd numbers.
10. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.

Semester VI – **SEC-IV (Skill Enhancement Course)**

Course: B.Sc.	Subject: Computer Science		Semester No:	VI
Paper: **SEC-IV**			Paper Code	
Title of the Paper	**MYSQL**		Maximum Marks	100
Hours of instructions per Week	Theory	-	CIA	25
	Practical	2 credits	ESE	75
Practical – 4 Hrs			Total	100
Objectives	To develop the knowledge using MYSQL.			

Total Instruction hours: 60 hrs

Unit No	Contents	Hours of instruction
I	MYSQL – Introduction - Commands and Data types, Operators and Expressions – Creating, Altering and Drop Tables (Including constraints).	20
II	Data Manipulation Commands - Insert, Update, Delete, Alter Queries - SELECT statement with WHERE, LIKE, GROUP BY and HAVING, ORDER BY, DISTINCT, TOP, LIMIT, ROWNUM and Special operators like IN, ANY, ALL BETWEEN, EXISTS, LIKE – Handling NULL values.	20
III	Different types of Join, Built in functions, Pattern Matching Operators, Views, Index. Transaction Control Statements - Commit, Rollback, Savepoint - Handling Duplicates – Exporting and Importing Data.	20

Text Books:	1. Baron Schwartz, High Performance MySQL, O'Reilly, 2012. 2. Vikram Vaswani , The Complete Reference MySQL , McGraw Hill Educations, 2004.
Reference Books :	1.Learning MYSQL by Seyed Tahaghogi, Hugh Williams 2. Sams **Teach Yourself SQL** in 10 minutes.
Practicals	**Software Lab Based on MYSQL (SQL/PL-SQL)**

[SQL COMMANDS]

1) SQL* formatting commands
2) To create a table, alter and drop table.
3) To perform select, update, insert and delete operation in a table.
4) To make use of different clauses viz where, group by, having, order by, union and intersection,
5) To study different constraints.

[SQL FUNCTION]

6) To use oracle function viz aggregate, numeric, conversion, string function.
7) To understand use and working with joins.
8) To make use of transaction control statement viz rollback, commit and save point.
9) To make views of a table.
10) To make indexes of a table.

[PL/SQL]

11) To understand working with PL/SQL
12) To implement Cursor on a table.
13) To implement trigger on a table.

Semester VI – **SEC- IV**

Course: B.Sc.	Subject: **Computer Science**		Semester No:	VI
Paper: **SEC-IV**			Paper Code	
Title of the Paper	**Advanced Java Script**		Maximum Marks	100
Hours of instructions per Week	Theory		CIA	25
	Practical	2 Credits	ESE	75
Practical – 4 hrs			Total	100
Objectives	**To obtain the basic knowledge of Java Script**			

Total Instruction hours: 60 hrs

Unit No	Contents	Hours of instruction
I	Introduction to Scripting Languages-Java Script- Syntax-Statements-Enable in Browser–Placement-Variables-Data Types-Operators-Conditional Statements-Loop Statements.	20
II	Java Script Functions – Libraries-Cookies-Page Redirect-Dialog Box. Object: Number-Boolean-String-Arrays-Date-Math- Regexp.	20
III	DOM-Error and Exceptions- Form Validation- Introduction to java Script and Ajax	20

Text Book:	1. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011.
Reference Book:	1. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013

Practicals	**SEC- IV - Java Script**

1. Write a java script program to create HTML tags using document object.
2. Write a java script program to sort the given numbers in ascending and descending order.
3. Write a java script program to find the Factorial of a number using functions.
4. Write a java script program to display largest and smallest numbers from the given list.
5. Write a java script program to display a digital clock.
6. Create a web page to display the text "WELCOME TO COMPUTER SCIENCE" as a heading and change its color from black to white and then to red at an interval of 1000 milliseconds.
7. Create a document and a link to it. When the user moves the mouse over the link, it should load the linked document on its own (user is not required to click on the link)
8. Create a document, which opens a new window without a toolbar, address bar.
9. Create a web page for getting personal details using form controls
10. Write a java script program to design a simple calculator using form fields. Have two fields for input and one field for the output. Allow user to be able to do plus, minus, multiply and divide.

Semester V –Non Major Elective for other Courses (NME)

Course: B.Sc	Subject: **Computer Science**		Semester No.	**V**	
Paper No: **NME**			Paper Code		
Title of the Paper	**Fundamentals of Computers and Office automation**		Maximum Marks	Theory	Practical
Hours of Instruction per week	Theory	3 Credits	CIA	10	10
	Practical	2 Credits	ESE	40	40
Practical –2 hrs, Theory -3 Hrs			Total	50	50
Objectives: To learn about the basic concepts of Computers and to know about the elementary operations					
Total Instruction hours: 45 hrs					

Unit No.	Contents	Hours of instruction
I	Introduction to Computers - Generation of Computers - Classification of Digital Computer - Anatomy of Digital Computer.Introduction **:** Introduction to computers-generation of modern computers- classification of digital computers- anatomy of a digital computer-memory units- auxiliary storage devices- input and output devices	9
II	Windows OS – control panel- desktop- folder. Introduction to word processing - Microsoft word: format- table –mail merge-macro-templates- symbol- drawing.	9
III	Introduction to electronic spreadsheet - Microsoft excel-formatting- function and formula- chart-pivot table- freeze pane-protect sheet- external data-sort and filter	9
IV	Introduction to presentation software- Microsoft power point- create, customize and show a presentation.	9
V	LAN and WAN - Internet and world wide web –e-mail –computers in office automation- introduction to e commerce.	9

Practical -30 Hrs	**NME – Practical – Office Automation Lab**	
MS Word: Format- mail merge- macros- template-table. **MS Excel:** Format- formulas and functions- chart wizard- Working Pivot table. **MS PowerPoint:** Creating a PowerPoint presentation- Customizing your Presentation- Showing Presentation.		
Text Books	Alexis Leon and Mathews Leon, "Introduction to Computers ", Leon Tech World, Chennai. D.P. Nagpal, "Computer Course", S.Chand & Company Ltd. New Delhi.	
Reference Texts	E.Balagurusamy,"Fundamentals of Computers ",Tata McGraw Hill Ltd., New Delhi. Taxali, "Pc Software for Windows made simple ", 1st Edition, 1998, Tata McGraw Hill Ltd., New Delhi. Sanjay Sexena, " MS- Office 2000 for Everyone", 2002, Vikas Publishing House pvt ltd., Chennai	

Semester V –Non Major Elective for other Courses (NME)

Course: B.Sc	Subject: **Computer Science**		Semester No.	**V**	
Paper No: **NME**			Paper Code		
Title of the Paper	**Basics of Internet and Browsing**		Maximum Marks	Theory	Practical
Hours of Instruction per week	Theory	3 Credits	CIA	10	10
	Practical	2 Credits	ESE	40	40
Practical –2 hrs, Theory-3 hrs			Total	50	50

Objectives: To learn about the basic concepts of Computers and to know about the elementary operations		
Total Instruction hours: 45 hrs		
Unit No.	Contents	Hours of instruction
I	The Internet and the World Wide Web: Overview: what is Internet, The Internet's history, The Internet' s major services, understanding the world wide web, using your browser and the world wide web, navigating the web, closing your browser, getting help with your browser, searching the web, search results and websites.	9
II	E-mail and other Internet Services: Overview: communicating through the Internet, using E-mail, using an E-mail program, Stomping out spam, using web based e-mail service, more features of the Internet.	9
III	Connecting to the Internet: Overview: Joining the Internet phenomenon, Connecting to the Internet through wires, How PC applications access the Internet, Connecting to the Internet wirelessly.	9
IV	Network basic and configuration: Setting IP addresses, Sharing files and folders-.Network troubleshooting. PING test, ipconfig etc.	9
V	Introduction to servers and network security .Types of servers: Files servers, Email Servers, Proxy servers etc. - Basics of Internet and Intranet: Types of Internet connections: Dialup, Broadband, Leased Line, Wi-Fi, Wi-Max, 2G, 3G, 4G, WWW, E-mails, Search Engines, Social Networking.	9
Text Books	1. Ron Mansfield, Working in Microsoft Office, Tata McGraw Hill (2008) (Chapters 13 to 23 and 29 to 38). 2. Peter Norton, Introduction to Computers, 6th Edition Tata McGraw Hill (2007) (Chapter 8A, 8B, 9A, 9B).	

Practical 30 Hrs-**NME – Internet and Browsing**

1. Sending and receiving emails.
2. Chatting on the internet.
3. Surfing the internet.
4. Document handling.
5. Using FTP and Telnet server.

Semester VI –Non Major Elective for other Courses (NME)

Course: B.Sc	Subject: **Computer Science**		Semester No.	**VI**	
Paper No. **Non- Major Elective for other Courses**			Paper code		
Title of the Paper	**Animation using Flash Player**		Maximum Marks	Theory	Practical
Hours of Instruction per week	Theory	3 Credits	CIA	10	10
	Practical	2 Credits	ESE	40	40
Theory -3 Hrs, Practical -2 hrs			Total	50	50
Objectives	To get an exposure to the Animation.				
Total Instruction hours: 45 hrs					

Unit No.	Contents	Hours of instruction
I	Introducing flash cs5 :Creating new flash documents-Exploring the user interface of flash CS5-Saving and closing a flash documents	9
II	Getting started the tools: Working with drawing tools Flash Working with the selection and modification Tools in flash-Working with colors in flash-Adding filters in flash. Working with Objects and Text: Editing objects in flash-Transforming objects and Text copying and Deleting objects.	12
III	Working with the TIMELINE Panel: Working with frames and key frames in flash-Working with Layers and Layer folders in flash.	5
IV	Using symbol, Instances and the Library:Exploring the types of symbols in flash-Creating symbols in flash-modifying symbols-inserting Instances in flash-exploring the LIBRARY Panel in flash	9
V	Working with Sound and Video: Working with sound files in flash-Using Video in flash. Creating animation: Understanding tweened Animation-Using Shape tweening in flash-Working with Motion Tweening in flash-Editing the Motion Path of tweened Object-Working with Motion Preset in flash-Working with 3D Animation in flash.	10
Practical 30 Hrs –Flashplayer		
1. Using drawing tools in flash. 2. Manipulating objects in flash. 3. Manipulating symbols in flash. 4.Working with sounds and videos 5. Create frame by frame animation.		
Text Book	Flash CS5 in simple steps Kogent Learning Solution	

Semester VI –Non Major Elective for other Courses (NME)

Course: B.Sc.	Subject: **Computer Science**		Semester No:	VI	
Paper: **Non-Major Elective for other Courses**			Paper Code		
Title of the Paper	**Web Designing using HTML**		Maximum Marks	Theory	Practical
Hours of instructions per Week			CIA	10	10
	Practical	5 Credits	ESE	40	40
Practical – 2 Hrs, Theory- 3 Hrs			Total	50	50
Objectives	**To obtain the basic knowledge of HTML programming**				

Total Instruction hours: 45 hrs

Unit No	Contents	Hours of instruction
I	Introduction : what is Internet – History of Internet – How the web works – web server & clients - looking at connection as ISP - ISDN – dialup or leased connection – DNS - Intranet - WWW - Overview of web Browsers.	10
II	Basics of HTML: components of HTML – hypertext - hypermedia - formatting HTML text – URL – Protocol - Server name - Port - relative URL and absolute URL - linking to other HTML documents - linking inside the same document. Formatting HTML text - working with LIST.	20
III	Working with Image - Image Map - HTML Tables - frames - frameset - forms - inserting audio and video files - background graphics & colour - scrolling marquees	15

Text Books:	Computer Fundamentals & Windows with Internet Technology by N.Krishnan Scitech Publications (India) Pvt . Ltd.
Reference book:	HTML -5 Complete reference.

Practical – 30 Hrs HTML Programming

1. Design a Web page using basic features.
2. Design a web page using hyperlink and hypermedia.
3. Design a web page using Image map and Frames.
4. Design a web page using Forms.

Semester V- Main Paper - B.Com Corporate Secretary Ship

Course: B.Com (CS)	Subject: **Corporate Secretary Ship**		Semester No.		**V**
Paper No. **Core Course –**			Paper Code		
Title of the Paper	Computer Applications in Corporate Offices.		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	3 credits	CIA	10	10
	Practical	2 Credits	ESE	40	40
Theory - 3 hrs; Practical- 2 Hrs.			Total	50	50
Objectives	*To provide an exposure to the use of office automation software and accounting package software in making business decisions.*				

Total Instruction hours: 45

Unit No.	Contents	Hours
I	Introduction to computer concepts − Components of computer − Characteristics of a computer – Classification of computers – Basic Computer Architecture – Input – output Devices – Software Concepts: Types of software – OS – Functions of OS – Windows Operating System – Folder, File operation.	9
II	Application of MS Office – Application of MS Word in Business Correspondence: letters, tables, mail merge, labels.	9
III	Application of MS Excel: Charts – Calculation of various Financial Functions – What-if Analysis- sorting and filtering data-conditional formatting-drop down validation and form controls- MS Access: Tables Queries-reports using wizard.	9
IV	Application of MS Power Point: Introduction – Navigating in Power Point – Creation of Slides, animation and templates – Designing Presentations – Slide Show Controls.	9
V	Application of Accounting Software Tally (Ver. 9. ERP): Features of Tally – Creation of Company – Creation of Ledgers – Vouchers – P&L a/c – Balance Sheet – Inventory Handling − Creation of Stock Items – Invoice Creation.	9
Text books	1. Rajagopalan, S.P., Computer Application in Business, Vikas Publishing House, New Delhi.	
Reference text books	1. Deepak Bharihoke., Fundamentals of IT, Excel Books, New Delhi. 2. Dhiraj Sharma., Foundation of IT, Excel Books, New Delhi. 3. Bhatnagar, S.C. & Ramani, K.V., Computers *and Information Management*, Prentice Hall of India, New Delhi. 4. Martin, *Principles of Data Base Management*, Prentice Hall of India, New Delhi. 5. Sulochana, M., Kameswara Rao, K. & Kishore Kumar, R.,*Accounting System*, Kalyani Publishers, Hyderabad. 6. Parameshwaran, R., *Computer Application in Business*, S.Chand & Co, New Delhi.	

Semester VI- Main Paper - B.Com Corporate Secretary Ship

Course: **B.Com (CS)**	Subject: **Corporate Secretary Ship**		Semester No.		**VI**
Paper No. **Core Course –**			Paper Code		
Title of the Paper	**Internet and E-Commerce**		Maximum Marks	Theory	Practical
Hours of instructions per week	Theory	3 Credits	CIA	10	10
	Practical	2 Credits	ESE	40	40
Theory - 3 Hrs; Practical-2 Hrs			Total	50	50
Objectives	To learn about the Internet and E-Commerce concepts and to get an exposure to the latest Information Technology.				

Total Instruction hours: 45

Unit No.	Contents	Hours
I	Internet:Uses-application-advantages-History of www-web-difference between Internet and web- ISP- Internet services-Internet addressing-Internet protocol- DNA- web browser- URL- DNS-Download-Upload-online-offline-Type of Internet connection-Modem- E-mail function – advantages-disadvantages-Search Engine.	9
II	HTML: Introduction-HTML TAGS- Structure – Basic commands-list-table-Linking document –adding Graphics to HTML- Image map-Frames.	9
III	Introduction: What is E-commerce-Evolution-Nature- Scope –Issues in Implementation- Impact, challengers & limitations of E-commerce-Market forces influencing I-way-components of I-way –Classification of E-Commerce -difference-application-benefits-advantages and disadvantages-E-Commerce Technologies-Framework.	9
IV	Electronicpayment System(EPS)-EFT-online banking-EDI:Introduction-components-EDI legal, security and privacy issues – EDI & E-commerce-(VAN) value added networks: Application-limitations- Advantages-Future	9
V	Online Shopping: Introduction – Process – advantages – disadvantages – E-payment : Benefits – components of electronic System – EFT – Credit card system on Internet – Components of online credit processing – popular E-payment methods.	9
Text books	1. Introduction to Information Technology by Dr. P. Rizwan Ahmed (Margham Publication). 2. E-Commerce by Dr. K.Abirami Devi ,Dr. M. Alagammai (Margham Publication)	
Reference books	1. Frontiers of E-Commerce by Dr. Kalkjala 2. E-Commerce & E-Business by Dr.C.S. Rayudu.	