DEPARTMENT OF COMPUTER APPLICATIONS

**Scheme and Syllabus
BCA
(Semester I – VI)**

Session w.e.f. 2017-2018

FACULTY OF INFORMATICS AND COMPUTING

J.C. BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA, FARIDABAD

SYNOPSIS OF
SCHEME OF STUDIES & EXAMINATIONS
3 YEARS BCA SEMESTER I-VI (w.e.f 2017)

Total Credits: 145
Total Theory Subjects: 24
Total MOOC Subject : 01
Total Audit Subject : 01
Total General Elective: 01
Total Labs (including Seminars, workshops & Projects): 8

Total Teaching Schedule (In one week in whole programme):

Lectures	Practical	Major Project	Total
124	**36**	**6**	**166**

Total Marks:

Sessional/Internals	End Term	Total
745	**2140**	**2885**

Itemize Break-up:

	No.	Hours	Marks	Credits
Theory Subjects	24	92	2300	114
MOOC Subject	1	4	Qualifying	04
Environment Science	1	3	Qualifying	No Credit
Audit Course	1	2	Qualifying	No Credit
Labs	6	36	360	18
General elective	1	5	100	3
Seminar	1	2	25	2
Projects	1	6	100	4
Total	31	150	2885	145

CHOICE BASED CREDIT SYSTEM SCHEME

Discipline Core Courses (DCC)			
Sr. No.	Name of the subject	No. of Lectures +Tutorials	No of Credits
1.	Computer & Programming Fundamentals	5	5
2.	PC Software	5	5
3.	Mathematics	5	5
4.	Logical Organization of Computer-I	5	5
5.	'C' Programming	5	5
6.	Logical Organization of Computer-II	5	5
7.	Mathematical Foundations of ComputerScience	5	5
8.	Structured System Analysis and Design	5	5
9.	Introduction to Operating System	5	5
10.	Data Structures	5	5
11.	Database Management System	5	5
12.	Communication skills (English)	4	4
13	Environmental Science	3	-
14.	Web Designing	5	5
15.	E-Commerce	5	5
16.	Object Oriented Programming Using C++	5	5
17.	Software Engineering	5	5
18.	Object Technologies & Programming usingJava	5	5
19.	Computer Graphics	5	5
20.	Data Communication and Networking	5	5

21.	VB.NET	5	5
22.	Mobile Application Development	5	5
23.	Software Testing	5	5
24.	Artificial Intelligence	5	5
	Total Credits		**114**

General Elective Course (Courses offered by the Department/ Programme)*

Sr. No	Code	Name the Subject	Internal	External	Credit
1	GEC-1 (BCA-17-308)	Artificial Intelligence	Uniform with other UG programmes of the University		3
2	GEC-2	Cyber laws and Security			3
3	GEC-3	Soft Computing			3
4	GEC-4	Web Technology and Information Retrieval			3
5	GEC-5	Intellectual Property and Rights			3

Mandatory Audit Course(MAC) (Mandatory to Qualify)

Sr. No	Code	Name the Subject	No. of contact hours
1.	AUD01	German-1	2
2.	AUD02	German-2(With German-1 as prerequisite)	2
3.	AUD03	French-1	2
4	AUD04	French-2(With French-1 as prerequisite)	2
5	AUD05	Sanskrit-1	2
6	AUD06	Sanskrit-2(With Sanskrit-1 as prerequisite)	2
7	AUD07	Personality Development	2
8	AUD08	Interview and Group discussion skills	2
9	AUD09	Yoga and Meditation	2
10	AUD10	Art of living/Living Skills	2
11	AUD11	Contribution of NSS towards Nation/role of NSS	2
12	AUD12	Physical Education	2

MOOC Subject (List is provided by the Svayam Portal of UGC)

Paper Code	Course	Course Requirements (Hrs)	Credits	University Exams	Internal Assessments	Total	Course Type
	MOOC*	4	4				

Note: Any one subject from the list of MOOC subject is to be *qualified during the Semester-1 to Semester-V* through Swayam Portal of UGC. For this subject, the Institute or the Department concerned will appoint a coordinator to track the activities of the student and will ensure that all students of the programme have qualified the MOOC subject in the specified time period.

Sr. No.	Name of the lab	No. of Contact Hours	Credits
	LABS & PROJECTS		
1	PC-Software Lab-Word, Excel and PowerPoint (Based on BCA-17-102)	6	3
2	C Programming Lab (Based on BCA-17-106)	6	3
3	Data Structure and SQL Programming Lab (Based on BCA-17-202 & BCA-17-203)	6	3
4	HTML and C++ Programming Lab (Based on BCA-17-206 & BCA-17-208)	6	3
5	Java & VB.NET Lab (Based on BCA-17-301 & BCA-17-304)	6	3
6	MAD and AI Programming Lab (Based on BCA-17-306 & BCA-17-308)	6	3
7.	Major Project	6	4
		Total Credits	**22**

BCA Scheme of Studies / Examination
Semester – I

Course No.	Course Title	Schedule				Sessional Marks /Internal	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
BCA-17-101	Computer & Programming Fundamentals	5		-	5	25	75	-	100	5
BCA-17-102	PC Software	5		-	5	25	75	-	100	5
BCA-17-103	Mathematics	5		-	5	25	75	-	100	5
BCA-17-104	Logical Organization of Computer-I	5		-	5	25	75	-	100	5
BCA-17-105	PC Software Lab (Word, Excel and Powerpoint)	-		6	6	30	-	70	100	3
	Total				26	130	300	70	500	23

Note: Exam duration will be as under
   (a)Theory exams will be of 3 hours duration
   (b)Practical exams will be of 3 hours duration

BCA Scheme of Studies / Examination
Semester – II

Course No	Course Title	Teaching Schedule				Sessional Marks/ Internal	Marks For End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
BCA-17-106	'C' Programming	5		-	5	25	75	-	100	5
BCA-17-107	Logical Organization of Computer-II	5		-	5	25	75	-	100	5
BCA-17-108	Mathematical Foundations of Computer Science	5		-	5	25	75	-	100	5
BCA-17-109	Structured System Analysis and Design	5		-	5	25	75	-	100	5
BCA-17-110	'C' Programming Lab	-		6	6	30	-	70	60	3
	Total				26	130	300	70	500	23

Note: Exam duration will be as under
    (a)Theory exams will be of 3 hours duration
    (b) Practical exams will be of 3 hours duration

BCA Scheme of Studies / Examination
Semester – III

	Course Title	Teaching Schedule				Sessional Marks/ Internal	Marks For End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
BCA-17-201	Introduction to Operating System	5	-	-	5	25	75	-	100	5
BCA-17-202	Data Structures	5	-	-	5	25	75	-	100	5
BCA-17-203	Database Management System	5	-	-	5	25	75	-	100	5
BCA-17-204 (A)	Communication skills	4	-	-	4	25	75	-	100	5
BCA-17-204 (B)	Environment Science(No credit just qualifying)	3			3		50		Marks will not be added in total	No credit just qualifying
BCA-17-205	Data Structure And Sql Lab	-	-	6	6	30	-	70	100	3
	Total				**28**	**130**	**300**	**70**	**500**	**23**

Note: Exam duration will be as under
   (a)Theory exams will be of 3 hours duration
   (b) Practical exams will be of 3 hours duration

BCA Scheme of Studies / Examination
Semester – IV

Course	Course Title	Teaching Schedule				Sessional Marks / Internal	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		T	P		
BCA-17-206	Web Designing	5	-	-	5	25	75	-	100	5
BCA-17-207	E-Commerce	5	-	-	5	25	75	-	100	5
BCA-17-208	Object oriented Programming UsingC++	5	-	-	5	25	75	-	100	5
BCA-17-209	Software Engineering	5	-	-	5	25	75	-	100	5
As per list above	Audit Course (No creditjust qualifying)	2			2				Marks will not be added in total	(No credit just qualifying)
BCA-17-210	HTML and C++ Lab	-	-	6	6	30	-	70	100	3
BCA-17-211	Seminar			2	2	25			25	2
	Total				30	155	300	70	525	25

Note: Exam duration will be as under
   (a)Theory exams will be of 3 hours duration
   (b)Practical exams will be of 3 hours duration

BCA Scheme of Studies / Examination
Semester – V

Course	Course Title	Teaching Schedule				Sessional Marks/Internal	Marks for End Term Examination		Total	Credits
		L	T	P	Total		Theory	Practical		
BCA-17-301	Object Technologies & Programming using Java	5	-	-	5	25	75	-	100	5
BCA-17-302	Computer Graphics	5	-	-	5	25	75	-	100	5
BCA-17-303	Data communication and networking	5	-	-	5	25	75	-	100	5
BCA-17-304	VB.NET	5	-	-	5	25	75	-	100	5
As per list above	General Elective	5			5	25	75		100	3
BCA-17-305	Java & VB.NETLab	-	-	6	6	30	-	70	100	3
	Total				31	155	375	70	600	26

Note: Exam duration will be as under
   (a)Theory exams will be of 3 hours duration
   (b)Practical exams will be of 3 hours duration

BCA Scheme of Studies / Examination
Semester – VI

Course No	Course Title	Teaching Schedule				Marks Sessional / Internal	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
BCA-17-306	Mobile Application Development	5	-	-	5	25	75	-	100	5
BCA-17-307	Software Testing	5	-	-	5	25	75		100	5
BCA-17-308	Artificial Intelligence	5	-	-	5	25	75	-	100	5
BCA-17-309	Major Project		-	6	6	30	-	70	100	4
BCA-17-310	MAD & AI Lab	-		6	6	30	-	70	100	3
	Total				27	135	225	140	500	22

Note: Exam duration will be as under
> **(a)Theory exams will be of 3 hours duration**
> **(b)Practical exams will be of 3 hours duration**

BCA-17-101: COMPUTER & PROGRAMMING FUNDAMENTALS
BCA I Semester

No. of Credits: 5	Sessional:	25 Marks
L T P Total	Theory:	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To learn the evolution of computer systems and a basic understanding of computer memory.
- To understand the hardware and software components of the computer system along with the working of operating system.
- To understand and implement the basic constructs of the programming language.
- To understand the various networking technologies.

Syllabus:

UNIT - I Computer Fundamentals: Generations of Computers, Definition, Block Diagram along with its components, characteristics & classification of computers, Limitations of Computers, Human- Being VS Computer, Applications of computers in various fields.

Memory: Concept of primary & secondary memory, RAM, ROM, types of ROM, Cache Memory, flash memory, Secondary storage devices: Sequential & direct access devices viz. magnetic tape, magnetic disk, optical disks i.e. CD, DVD, virtual memory.

UNIT - II Computer hardware & software: I/O devices, definition of software, relationship between hardware and software, types of software.

Overview of operating system: Definition, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single- user & multi-user operating system.

Computer Virus: Definition, types of viruses, Characteristics of viruses, anti-virus software.

UNIT - III **Computer Languages:** Analogy with natural language, machine language, assembly language, high-level languages, forth generation languages, compiler, interpreter, assembler, Linker, Loader , characteristics of a good programming language, Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation, Structured programming concepts, Programming methodologies viz. top-down and bottom- up programming, Advantages and disadvantages of Structured programming

UNIT - IV **Overview of Networking:** An introduction to computer networking, Network types (LAN, WAN, MAN), Networktopologies, Modes of data transmission, Forms of data transmission, Transmission channels(media), Introduction to internet and its uses, Applications of internet, Hardware and Software requirements for internet, Intranet, Applications of intranet.

Course Outcomes:
Upon successful completion of the course, the students will be able to:

- Understand how the computer systems evolved and about the various types of memories used by a computer system.
- Understand of various hardware and software components, different functions of operating system and the knowledge of computer viruses.
- Solve and implement the problems using basic programming
- Analyze the concept of internet, intranet and essential concepts related to computer networking.

Text Books/ Reference Books:

1. Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi.
2. Balagurusamy E, Computing Fundamentals and C Programming, Tata McGraw Hill.
3. Norton, Peter, Introduction to Computer, McGraw-Hill
4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
5. Rajaraman, V., Fundamentals of Computers, PHI
6. Ram, B., Computer Fundamentals, Architecture & Organization, New Age International
   (P) Ltd.
7. Chhillar, Rajender Singh: Application of IT to Business, Ramesh Publishers, Jaipur.
8. Gill, Nasib Singh: Essentials of Computer and Network Technology, Khanna Books Publishing Co., New Delhi

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-102:   PC SOFTWARE

BCA I Semester

No. of Credits: 5L	Sessional:	25 Marks
T P Total	Theory:	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To understand the basics of computer hardware and software.
- To learn the basics and components of MS Windows.
- To understand and apply the basic as well as advanced features of MS Word.
- To understand and use the essential operations and features of MS Excel to create spreadsheets.
- To create effective presentations using MS Powerpoint.

Syllabus:

UNIT – I MS-Windows: Operating system-Definition & functions, basicsof Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

UNIT – II Documentation Using MS-Word: Introduction to word processing interface, Toolbars, Menus, Creating & Editing Document, Formatting Document, Finding and replacing text, Format painter, Header and footer, Drop cap, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Previewing and printing document, Advance Features of MS-Word-Mail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.

UNIT – III Electronic Spread Sheet using MS-Excel: Introduction to MS- Excel, Cell, cell address, Creating & Editing Worksheet, Formatting and Essential Operations, Moving and copying data in excel, Header and footer, Formulas and Functions, Charts, Cell referencing, Page setup, Macros, Advance features of MS-Excel- Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel-Sorting, Filtering, Validation, What if analysis with Goal Seek, Conditional formatting.

UNIT – IV Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

Course Outcomes:

The student will be able to:

- Perform basic operations on a computer system and how to work with windows.
- Create effective documents in a well suitable format.
- Create MS Excel spreadsheets using suitable functions and formulas.
- Make effective and attractive presentations using various in built features, sounds and animations and layering

Text Books/Reference Books:

1. Microsoft Office – Complete Reference – BPB Publication

2. Learn Microsoft Office – Russell A. Stultz – BPB Publication

3. Courter, G Marquis (1999). Microsoft Office 2000: Professional Edition. BPB.

4. Koers, D (2001). Microsoft Office XP Fast and Easy. PHI.

5. Nelson, S L and Kelly, J (2002). Office XP: The Complete Reference. Tata McGraw-Hill.

Note: Latest and additional good books may be suggested and added from time to time

BCA-17-103: MATHEMATICS
BCA I Semester

No. of Credits: 5
L T P   Total
5 0 0   5

Sessional: 25 Marks
Theory: 75 Marks
Total   :   100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

- To make students learn sets , subsets, union and intersection of sets and simple application
- To familiarize with matrices, determinants and solve system of linear equation
- To learn about relation , function, limit ,continuity and types of discontinuity
- To know about derivatives of various functions
- To familiarize with Definite and Indefinite integrals

Syllabus:

UNIT - I **Sets:** Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

Determinants: Definition, Minors, Cofactors, Properties of Determinants, Applications of determinants in finding area of triangle, Solving a system of linear equations.

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, solving system of linear equation Cramer's Rule.

UNIT - II **Relations and functions:** Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range,Onto, Into and One to One Functions, Composite and Inverse Functions.

Limits & Continuity: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity of a function at a Point, Continuity Over an Interval, Sum, product and quotient of continuous functions, Intermediate Value Theorem, Type of Discontinuities.

UNIT - III **Differentiation:** Derivative of a function, Derivatives of Sum, Differences, Product & Quotient of functions, Derivatives of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Chain Rule and differentiation by substitution.

UNIT - IV **Integration:** Indefinite Integrals, Methods of Integration by Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Reduction Formulae for simple and Trigonometric Functions, Definite Integral as Limit of Sum, Fundamental Theorem of Integral Calculus, Evaluation of definite integrals by substitution, using properties of definite integral.

Course Outcomes:

The students will be able to
- Apply the knowledge of mathematics and basics of maths .
- Identify formula, review, research and analyze complex computer problem and reaching on conclusion using first principal of mathematics.
- Demonstrate knowledge and understanding of the computer application using mathematics
- Recognize the need of mathematics in various fields like area , relation while using computer application.
- To provide a stimulating research environment so as to motivate the students for higher studies

Text Books/ Reference Books:

1. C.L.Liu: Elements of Discrete Mathematics, McGraw Hill.
2. Lipschutz, Seymour: Discrete Mathematics, Schaum's Series
3. Babu Ram: Discrete Mathematics, Vinayek Publishers, New Delhi.
4. Trembley, J.P & R. Manohar: Discrete Mathematical Structure with Application to Computer Science, TMH.
5. Kenneth H. Rosen: Discrete Mathematics and its applications, TMH.
6. Doerr Alan & Levasseur Kenneth: Applied Discrete Structures for Computer Science, Galgotia Pub. Pvt. Ltd.
7. Hopcroft J.E, Ullman J.D.: Introduction to Automata theory, Languages and Computation, Narosa Publishing House, New Delhi.

BCA-17-104: LOGICAL ORGANIZATION OF COMPUTER-I
BCA I Semester

No. of Credits: 5	Sessional:	25 Marks
L T P Total	Theory:	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES:

- To introduce the fundamentals of digital electronics.
- To apply the fundamentals of digitals electronics to simplify the Boolean expression.
- To become familiar with basic gates which are useful for designing of digital circuits.
- To familiar the students about the design and analyze various combinational circuits.

Syllabus:

UNIT – I **Information Representation:** Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode

UNIT – II **Binary Logic:** Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

UNIT – III **Digital Logic:** Introduction to digital signals, Basic Gates – AND, OR, NOT, Universal Gates and their implementation – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.

UNIT – IV **Combinational Circuits:** Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Parallel binary adder/subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators,Code Converters, BCD to Seven-Segment Decoder.

Course Outcomes:

At the end of program the student acquired knowledge about:

- Acquire knowledge about fundamentals of digital electronics.
- Solve basic problems using Boolean algebra and k-map.
- Design complex circuits using basic gates.
- Analyze and design various Combinational circuits.

Text Books/ Reference Books:

1. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.

2. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.

3. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

4. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.

5. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

Note: Latest and additional good books may be suggested and added from time to time

BCA-17-105: PC SOFTWARE LAB- WORD, EXCEL AND POWER POINT
BCA I Semester

No. of Credits: 3	Sessional:	30 Marks
L T P Total	Practical:	70 Marks
0 0 6 6	Total :	100 Marks
	Duration of Exam:	3 Hours

List of Experiments:

PC Hardware:
1. Set date and time of the windows and change screensaver and appearance.
2. Manage files and folders.
3. To study parts of keyboard and mouse
4. To assemble a PC.
5. To remove, study and replace floppy disk drive, hard disk and CD ROM drive.

PC Software:
1. To prepare your CV using MS Word.
2. Create a mail merge letter using MS Word.
3. Create a macro for inserting a picture and formatting the text.
4. Create a simple presentation to list simple dos commands, hardware, software using MS Power Point.
5. Add text, pictures, sounds, movies, and charts to your presentations.
6. Set up slide shows and rehearse timings for your slides.
7. Create a worksheet with 4 columns, enter 10 records and find the sum of all columns using MS Excel.
8. Create a student result sheet.
9. Create a simple bar chart to highlight the sales of a company for 3 different periods.
10. Create, record and use macro in MS Excel.
11. Sorting and filtering of data
12. Create pivot tables and pivot charts.

BCA-17-106: 'C' PROGRAMMING
BCA II Semester

No. of Credits: 5	Sessional: 25 Marks
L T P Total	Theory: 75 Marks
5 0 0 5	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To understand the building blocks of C language like variables, data types, managing I/O etc.
- To understand the different statements like sequential, decision making, iterative such as if-else, loops.
- To understand derived data types like arrays and storage Classes.
- To learn about the concept of Pointers, understand built in and user defined functions.
- To learn about the designing of the algorithms and flow charts.
- To enhance the analyzing and problem-solving skills and use the same for writing programs in C.

Syllabus:

UNIT - I **Overview of C:** History of C, Importance of C, Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant, Structure of a C Program, printf(), scanf() Functions, Operators &

Expression: Arithmetic, relational, logical, bitwise, unary, assignment, shorthand assignment operators, conditional operators and increment and decrement operators, Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

UNIT - II **Decision making & branching:** Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement.

Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement, Nested loops.

UNIT - III **Functions:** Standard Mathematical functions, Input/output: Unformatted &

formatted I/O function in C, Input functions viz. getch(), getche(), getchar(), gets(), output functions viz., putch(), putchar(), puts(), string manipulation functions.

User defined functions: Introduction/Definition, prototype, Local and global variables, passing parameters, recursion.

UNIT - IV **Arrays, strings and pointers:** Definition, types, initialization, processing an array, passing arrays to functions, Array of Strings. String constant and variables, Declaration and initialization of string, Input/output of string data, Introduction to pointers.

Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.

Algorithm development, Flowcharting and Development of efficient program in C.

Course Outcome

The student will be able to**:**

- Develop programming skills using the fundamentals and basics of C Language.
- Acquire knowledge about building blocks of C language like variables, data types, managing I/O etc.
- Solve basic problems using different statements like sequential, decision making, iterative such as if-else, loops and derived data types like arrays
- Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
- Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.

Text Books/ Reference Books:

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill

2. Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi.

3. Balagurusamy, E., Programming in ANSI C, 4E, Tata McGraw-Hill

4. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.

5. Yashwant Kanetker, Let us C, BPB.

6. Rajaraman, V., Computer Programming in C, PHI.

7. Yashwant Kanetker, Working with C, BPB.

BCA-17-107: LOGICAL ORGANIZATION OF COMPUTER-II
BCA II Semester

No. of Credits: 5
L T P   Total
5 0 0   5

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES:

- To introduce the fundamentals of sequential circuits and logic.
- To give exposure to the students about design and analysis of various sequential circuits.
- To become familiar with current state of art in memory system design.
- To become familiar with how Instructions are designed and I/O devices are being accessed and its principles

Syllabus:

UNIT – I **Sequential Logic:** Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops. State table, state diagram and state equations. Flip-flop excitation tables

UNIT – II **Sequential Circuits:** Designing registers – Serial Input Serial Output (SISO), Serial Input Parallel Output (SIPO), Parallel Input Serial Output (PISO), Parallel Input Parallel Output (PIPO) and shift registers. Designing counters – Asynchronous and Synchronous Binary Counters, Modulo-N Counters and Up-Down Counters

UNIT – III **Memory & I/O Devices:** Memory Parameters, Semiconductor RAM, ROM, Magnetic and Optical Storage devices, Flash memory, I/O Devices and their controllers.

UNIT – IV **Instruction Design & I/O Organization:** Machine instruction, Instruction set selection, Instruction cycle, Instruction Format and Addressing Modes. I/O

Interface, Interrupt structure, Program- controlled, Interrupt-controlled & DMA transfer, I/O Channels, IOP.

COURSE OUTCOMES:

At the end of program the student acquired knowledge about:
1. Acquire Knowledge about fundamentals of sequential logic circuits.
2. Design and analyze various sequential circuits.
3. Familiar with various types of memories and memory hierarchy.
4. Understand basic instruction set and I/O devices.

Text Books/ Reference Books:

1. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.

2. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.

3. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

4. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.

5. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill.

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-108: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
BCA II Semester

No. of Credits: 5	Sessional:	25 Marks
L T P Total	Theory:	75 Marks
5 0 0 5	Total:	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course objectives
1. To deal with statistical concepts and use mathematical concepts in problem-solving
2. To develop logical thinking and its application to computer science
3. Students should analyze the structure of real-world problems and plan solution strategies.
4. Engage students in sound mathematical thinking and reasoning and develop a mathematical vocabulary

Syllabus:

UNIT - I **Basic Statistics**: Measure of Central Tendency, Preparing frequency distribution table, Mean, Mode, Median, Measure of Dispersion: Range, Variance and Standard Deviations, Correlationand Regression.

UNIT - II **Algorithm:** Algorithms, merits and demerits, Exponentiation, How to compute fast exponentiation. Linear Search, Binary Search, "Big Oh" notation, Worst case, Advantage of logarithmic algorithms over linear algorithms, complexity.

Graph Theory: Graphs, Types of graphs, degree of vertex, sub graph, isomorphic and homeomorphic graphs, Adjacent and incidence matrices, Path Circuit ; Eulerian, Hamiltonian path circuit.

UNIT - III **Tree:** Trees, Minimum distance trees, Minimum weight and Minimum distance spanning trees.

Recursion: Recursively defined function. Merge sort, Insertion sort, Bubble

sort, and Decimal to Binary.

UNIT - IV **Recurrence Relations:** LHRR, LHRRWCCs, DCRR. Recursive procedures.

Number Theory: Principle of Mathematical induction**,** GCD, Euclidean algorithm, Fibonacci numbers, congruences and equivalence relations, public key encryption schemes.

Course outcomes:
At the end of the program the student will be able :
- To recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines
- To understand and apply the fundamental concepts in graph theory
- To acquire ability to describe problems and their complexity in a formal mathematical manner
- To develop a deeper conceptual understanding of the theoretical basis of number theory and cryptography

Text Books/ Reference Books:

1. Gupta S.P. and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand & Sons, 1996.

2. Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical statistics, Sultan Chand and Sons, 1995.

3. Graybill, Introduction to Statistics, McGraw.

4. Anderson, Statistical Modelling, McGraw.

5. Babu Ram : Discrete Mathematics

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-109: STRUCTURED SYSTEMS ANALYSIS AND DESIGN
BCA II Semester

No. of Credits: 5
L T P Total
5 0 0   5

Sessional: 25 Marks
Theory: 75 Marks
Total   :   100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES:
- To understand the basic terminology used in a system analysis and design, system development life cycle and initial investigation for gathering the information.
- To become familiar with the various tools of structured analysis, how to analyze the feasibility and different methods for determining the costs and benefits.
- To understand the design phase and its objectives, input/output and form design.
- To become familiar with the testing techniques, system implementation, its maintenance and its documentation

Syllabus:

UNIT - I Introduction to system, Definition and characteristics of a system, Elements of system, Types of system, System development life cycle, Role of system analyst, Analyst/user interface, System planning and initial investigation: Introduction, Bases for planning in system analysis, Sources of project requests, Initialinvestigation, Fact finding, Information gathering, information gathering tools, Fact analysis, Determination of feasibility.

UNIT - II **Structured analysis, Tools of structured analysis:** DFD, Data dictionary, Flow charts, Gantt charts, decision tree, decision table, structured English, Pros and cons of each tool, Feasibility study: Introduction, Objective, Types, Steps in feasibility analysis, Feasibility report, Oral presentation, Cost and benefit analysis: Identification of costs and benefits, classification of costs and benefits, Methods of determining costs and benefits, Interpret results of analysis and take final action.

UNIT - III **System Design:** System design objective, Logical and physical design, Design Methodologies, structured design, Form-Driven methodology(IPO charts), structured walkthrough, Input/Output and form design: Input design, Objectives of input design, Output

design, Objectives of output design, Form design, Classification of forms, requirements of form design, Types of forms, Layout considerations, Form control.

UNIT - IV **System testing:** Introduction, Objectives of testing, Test plan, testing techniques/Types of system tests, Quality assurance goals in system life cycle, System implementation, Process of implementation, System evaluation, System maintenance and its types, System documentation, Forms of documentation.

Course Outcome:

The students will be able to
- Understand basic terminology used in a system analysis and design, SDLC and understand the role of a system analyst and different information gathering techniques.
- Understand structured analysis, pros and cons of each tool used, steps used in feasibility study and the cost/benefit analysis.
- Understand Design methodologies, objectives of input/output design and requirements of form design
- Understand the quality assurance goals, process of system implementation, system maintenance and forms of documentation

Text Books/ Reference Books:

1. Systems Analysis and design BY e.m. aWAD Galgotia Pub.(P) Ltd.

2. Data Management and Data Structures by Loomis (PHI)

3. System Analysis and Design by Elias Awad.

4. Introductory System analysis and Design by Lee Vol. I & II

BCA-17-110: C PROGRAMMING LAB
BCA II Semester

No. of Credits: 3
L T P Total
0 0 6 6

Sessional: 30 Marks
Practical: 70 Marks
Total : 100 Marks
Duration of Exam: 3 Hours

List of Experiments:

1. Write a program to add, subtract, multiply and divide two numbers using menu driven program.

2. Write a program to find the largest of three numbers. (if-then-else)

3. Write a program to find the largest of ten numbers. (for statement)

4. Write a program to find the average mail height & average female heights in the class (input is in the form of gender code, height).

5. Write a program to find roots of a quadratic equation using functions and switch statements.

6. Write a program to calculate sum of n numbers using do-while loop.

7. Write a program using arrays to find the largest and second largest number out of given 50 numbers.

8. Write a program to multiply two matrices.

9. Write a program to read a string and write it in reverse order.

10. Write a program to concatenate two strings of different lengths.

11. Write a program to transpose a given matrix.

12. Write a program to swap two numbers using pointers.

13. Write a program to check that the input string is a palindrome or not

14. Write a program to find factorial of a number using function.

15. Write a program to calculate a^b using function.

16. Write a program to print Fibonacci series using recursion.

BCA-17-201: INTRODUCTION TO OPERATING SYSTEM
BCA III Semester

No. of Credits: 5
L T P Total
5 0 0 5

Sessional: 25 Marks
Theory : 75 Marks
Total : 100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To understand evolution and types of OS and to understand the structure, components and functions of OS.
- To learn about Processes, threads and various Scheduling policies.
- To understand the principle of Deadlocks.
- To understand various memory management schemes.
- To understand virtual memory management, Disk management, I/O management and File systems

Syllabus:

UNIT – I Fundamentals of Operating system: Introduction to Operating System, its need and operating System services, Early systems, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems.

Process Management: Process concept, Operation on processes, Cooperating Processes, Threads, and Inter-process Communication.

UNIT-II CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms: FCFS, SJF, Round Robin & Queue Algorithms.

Deadlocks: Deadlock characterization, Methods for handling deadlocks, Banker'sAlgorithm.

UNIT-III Memory Management: Logical versus Physical address space, Swapping, Contiguous allocation, Paging, Segmentation.

Virtual Memory: Demand paging, Performance of demand paging, Page replacement, Page replacement algorithms, Thrashing.

UNIT-IV File management: File system Structure, Allocation methods: Contiguous allocation, Linked allocation, Indexed allocation, Free space management: Bit vector, Linked list, Grouping, Counting.

Device Management: Disk structure, Disk scheduling: FCFS,SSTF, SCAN, C-SCAN, LOOK, C-LOOK.

COURSE OUTCOMES

- The students will be familiar with various types of OS and will also understand the various functions of OS.

- The students will be able to understand CPU scheduling along with its various algorithms. Also, the students will be familiar with different deadlock handling algorithms.

- The students will become familiar with various memory management schemes like demand paging and segmentation and also able to understand virtual memory and page replacement algorithms.

- The students will be able to understand disk scheduling and different file handling schemes in OS.

Text Books/ Reference Books:

1. Abraham Silberschatz, Peter B. Galvin, " Operating System Concepts", AddisonWesley publishing. Co.,
   7th. Ed., 2004.

2. Nutt Gary, "Operating Systems", Addison Wesley Publication, 2000.

3. Andrew S. Tannenbaum, "Modern Operating Systems", Pearson Education Asia,Second Edition, 2001.

4. William Stallings, "Operating Systems, "Internals and Design Principles", 4th Edition,PH, 2001.

5. Ekta Walia, "Operating Systems Concepts", Khanna Publishes, New Delhi, 2002.

BCA 17-202:   DATA STRUCTURES
BCA III Semester

No. of Credits: 5	Sessional: 25 Marks
L T P Total	Theory : 75 Marks
5 0 0 5	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives
- To impart the basic concepts of data structures and algorithms along with introduction to strings and some basic search algorithms (Linear Search and Binary Search).
- To understand Arrays and linked list in detail.
- To understand the concept of stacks and queues along with their representations in memory.
- To understand the representation and traversal of trees and graphs along with some algorithms in detail

Syllabus:

UNIT–I Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notataion.

Strings: Introduction, Storing strings, String operations, Pattern matching algorithms, Liner search, binary search.

UNIT – II Arrays: Introduction, Linear arrays, Representation of linear array in memory, address calculations, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse arrays.

Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Threaded lists, Garbage collection, Applications of linked lists.

UNIT – III Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Recursion.

Queues: Introduction, Array and linked representation of queues,

Operations on queues, Deques, Priority Queues, Applications of queues.

UNIT – IV Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithms using stacks.

Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs, Warshall's algorithm for shortest path, Dijkstra algorithm for shortest path, Operations on graphs, Traversal of graph.

Course Outcomes
Students will be able to

- Understand about the various types of data structures along with their advantages and disadvantages.
- For a given algorithm student will be able to analyse them to determine the time and computation complexity.
- For a given search problem (Linear search and Binary search) student will be able to implement it.
- For a given problems of Arrays, Stacks, Queues, linked list and trees, student will be able to implement it and analyse the same to determine the time and computation complexity.
- Student will be able to implement tree and graph search, traversal algorithms and determine their time and computation complexity \

Text Books/ Reference Books:

1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill

2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orient Longman.

3. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Mcgrraw- Hill International Student Edition, New York.

4. Mark Allen Weiss Data Structures and Algorithm Analysis In C, Addison- Wesley, (An Imprint Of Pearson Education), Mexico City.Prentice- Hall Of India Pvt. Ltd., New Delhi.

5. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Prentice- Hall of India Pvt. Ltd., New Delhi.

BCA -17-203: DATABASE MANAGEMENT SYSTEM
BCA III Semester

No. of Credits: 5	Sessional:	25 Marks
L T P Total	Theory :	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES:

- The students will understand basic terminology used in database systems, basic concepts, the applications of database systems and understand role of Database administrator in DBMS.
- The students will understand various data model like Hierarchical model, Network Model, Relational model, E-R model and will be able to make E-R diagram from data given by user and table from E-R diagram.
- The students will become familiar with relational database theory and be able to write relational algebra expressions for query and will be able to understand the logical design guidelines for databases, normalization approach, primary key, super key, foreign key concepts.
- The students will become familiar with basic issues of transaction processing, query optimization and Concurrency, security and control.

Syllabus:

UNIT – I Basic Concepts: Data, Information, Records and files. Traditional file –based Systems-File Based Approach-Limitations of File Based Approach, Database Approach-Characteristics of Database Approach, advantages and disadvantages of database system, components of database system, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, DBMS users, Advantages and Disadvantages of DBMS, DBMS languages.

Roles in the Database Environment - Data and Database Administrator, Database Designers, Applications Developers and Users.

UNIT – II Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings andInstances.

Data Independence – Logical and Physical Data Independence, Classification of Database Management System, Centralized and Client Server architecture to DBMS .

Data Models: Records- based Data Models, Object-based Data Models, Physical Data Models and Conceptual Modeling.

UNIT – III Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams, abstraction and integration.

Basic Concepts of Hierarchical and Network Data Model, Relational Data Model - Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints overRelations.

UNIT – IV Relational algebra, Relational calculus, Relational database design: Functional dependencies, Modification anomalies, Ist to 3rd NFs, BCNF, 4th and 5th NFs, computing closures of set FDs, SQL: Data types, Basic Queries in SQL, Insert, Delete and Update Statements, Views, Query processing: General strategies of query processing, query optimization, query processor, concept of security, concurrency and recovery.

COURSE OUTCOMES

The students will be able to

- Understand basic terminology used in database systems, basic concepts, the applications of database systems and understand role of Database administrator in DBMS. The students will also be able to understand various data model like Hierarchical model, Network Model, Relational model, E- R model and will be able to make E-R diagram from data given by user and table from E-R diagram
- Work with relational database theory and be able to write relational algebra expressions for query.
- Understand the logical design guidelines for databases, normalization approach, primary key, super key, and foreign key concepts.
- Understand the issues of transaction processing, query optimization and Concurrency, security and control.

Text Books/ Reference Books:

1. Elmasri & Navathe, "Fundamentals of Database Systems", 5th edition, Pearson Education.

2. Thomas Connolly Carolyn Begg, "Database Systems", 3/e, Pearson Education

3. C. J. Date, "An Introduction to Database Systems", 8th edition, Addison Wesley N. Delhi.

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-204 (A): COMMUNICATION SKILLS (ENGLISH)
BCA III Semester

No. of Credits: 5	Sessional: 25 Marks
L T P Total	Theory : 75 Marks
4 0 0 4	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES:

- To make the students aware about the role and importance of Communication.

- To motivate the students towards practical communication skills and development of soft skills.

- To equip the students to use the vocabulary in various contexts with focus on developing fluency.

- To enhance the presentation skills of the students and preparing them for challenging situations.

Syllabus:

UNIT-I Introduction to Basics of Communication: Communication and its various definitions, features/characteristics of the communication, process of communication, communication model and theories, barrier to effective communication.

UNIT-II Improving LSRW: introduction, verbal and nonverbal communication, listening process, group discussion, forms of oral presentation, self-presentation, dyadic communication, 5C's of communication, Developing dialogues, soft skill.

UNIT-III Basic vocabulary: how to improve vocabulary, prefix/suffix, synonyms/antonyms, one word substitution, spellings

Developing fluency: Grammar(conjunction, auxiliaries, prepositions, articles, tenses……), language games.

UNIT-IV Proper use of Language: The Communication Skills, The effective Speech.
Effective self-presentation & facing interview: The interviewprocess & preparing for it, The presentation skills.

COURSE OUTCOMES:

At the end of the course the student will be able to:

- Display awareness about the role and importance of Communication.
  Apply principles of practical communication and soft skills in their routine interactions.
- Demonstrate a better vocabulary and diction.
- Create persuasive presentations and display remarkable presentation skills.

Text Books/ Reference Books:

1. Vik, Gilsdorf, "Business Communication", Irwin
2. K K Sinha, "Business Communication", Himalaya Publishing House / Galgoria Publication
3. Bovee, "Business Communication", Pearson ' PHI
4. Mohan, Banerjee, Business Communication, Mac million
5. Raman, Singh – Business communication – Oxford Press

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-204 (B): ENVIRONMENT SCIENCE
BCA III Semester

No. of Credits: 0	Sessional:	NIL
L T P Total	Theory :	50 Marks
3 0 0 3	Total :	50 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 10 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 10 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objective
• The prime objective of the course is to provide the students a detailed knowledge on the threats and challenges to the environment due to developmental activities.
• The students will be able to identify the natural resources and suitable methods for their conservation and sustainable development.
• The focus will be on awareness of the students about the importance of ecosystem and biodiversity for maintaining ecological balance.
• The students will learn about various attributes of pollution management and waste management practices.
• The course will also describe the social issues both rural and urban environment and environmental legislation.

Syllabus:

UNIT-I   The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance. Need for public awareness.

Natural Resources: Renewable and Non-RenewableResources: Natural resources and associated problems: Forestresources, Water resources, Mineral resources, Food resources,Energy resources, Land resources, Role of an individual inconservation of natural resources.

UNIT-II Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert

ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity and its Conservation: Introduction – Definition: genetic, species and ecosystem diversity, bio geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, threats to biodiversity, Conservation of biodiversity: insitu and ex-situ conservation of biodiversity.

UNIT-III Environmental Pollution: Definition, Causes, effects and control measures of: Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV Social Issues and the Environment: From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products.

Course Outcome:

- The course is to will provide the students a detailed knowledge on the threats and challenges to the environment due to developmental activities.
- The students learned suitable methods for their conservation and sustainable development.
- The importance of ecosystem and biodiversity for maintaining ecological balance defined.
- The various attributes of pollution management and waste management practices learned.

Text Books/ Reference Books:

1. Perspectives in Environmental Studies by A. Kaushik and C. P. Kaushik, New age international publishers.

2. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi.

3. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.

4. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela 2008 PHI Learning Pvt Ltd.

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-205: DATA STRUCTURE AND SQL LAB
BCA III Semester

No. of Credits: 3	Sessional:	30 Marks
L T P Total	Theory :	70 Marks
0 0 6 6	Total :	100 Marks
	Duration of Exam:	3 Hours

List of Experiments:

Data Structure Lab

1. Write a program to print sum of digits of a number.

2. Write a program to print Fibonacci series.

3. Write a program to calculate factorial of a number using recursion.

4. Write a program to check whether the number is prime or not.

5. Write a program to find sum of two 2-D arrays

6. Write a program to multiply two 2-D arrays.

7. Write a program to perform various operations on Stack.

8. Write a program to perform various operations on queues.

9. Write a program to perform various operations on Linked List.

10. Write a program to perform various operations on Binary Tree.

SQL Lab

1. Introduction to SQL.

2. Write a program to create a table in SQL.

3. Write a program to perform various operations like Drop, Alter and Truncate on a table.

4. Write a program to perform various queries in SQL.

5. Write a program to perform Selection, Projection and Join Operations on tables.

BCA -17-206: WEB DESIGNING
BCA IV Semester

No. of Credits: 5   Sessional: 25 Marks
L T   P   Total   Theory :   75 Marks
5 0   0   5   Total :   100 Marks
                                                     Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES

- To familiarize the students with the basic concepts of internet, its history and various fundamental features of world wide web like HTTP, TCP,IP protocols etc,
- To provide a detailed understanding of search engines , its components and working .
- To familiarize the students fundamentals of Web site design and Publishing
- To acquaint the students with the basics of HTML and acquaint them with advanced graphics features for designing effective web sites.
- To teach the student the concepts of cascading style sheets and basics of client side scripting using JavaScript

Syllabus:

UNIT – I Introduction to Internet and World Wide Web: Evolution and History of
World Wide Web; Basic features; Web Browsers; Web Servers; Hypertext
Transfer Protocol, Overview of TCP/IP and its services; URLs; Searching and
Web-Casting Techniques; Search Engines and Search Tools;

UNIT – II Web Publishing: Hosting your Site; Internet Service Provider; Web
terminologies, Phases of Planning and designing your Web Site; Steps for
developing your Site; Choosing the contents; Home Page; Domain Names,
Front page views, Adding pictures, Links, Backgrounds, Relating Front Page
to DHTML.
Creating a Website and the Markup Languages (HTML, DHTML);

UNIT – III Web Development: Introduction to HTML; Hypertext and HTML; HTML
Document Features; HTML command Tags; Creating Links; Headers; Text

styles; Text Structuring; Text colors and Background; Formatting text; Page layouts;

UNIT – IV Images: Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes;

DHTML: Dynamic HTML, Features of DHTML, CSSP (cascading style sheet positioning) and JSSS (JavaScript assisted style sheet), Layers of netscape, The ID attributes, DHTML events.

Course Outcomes:
At the end of the program the student would be

- Acquainted with the basics of internet, its applications and ways to connect to it
- Learned the basics and types of search engines
- Hand on practice on HTML and learned the need and basics of CSS and the concepts of client side JavaScript
- Acquainted with the difference between client side and server side scripting
- Import multimedia pages over web.

Text Books/ Reference Books:

1. Douglas E. Comer : Computer Networks and Internets.
2. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.
3. Thomas A. Powell, "Web Design: The Complete Reference" , 4/e, Tata McGraw-Hill.
4. Wendy Willard, "HTML Beginners Guide", Tata McGraw-Hill.
5. Deitel and Goldberg, "Internet and World Wide Web, How to Program", PHI.

BCA-17-207: E-COMMERCE
BCA IV Semester

No. of Credits: 5	Sessional: 25 Marks
L T P Total	Theory : 75 Marks
5 0 0 5	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

COURSE OBJECTIVES

- Students will be able to understand about basic concepts, importance, applications and future of Ecommerce along with the working of Electronic markets.

- To understand the concept of Value chains, Supply chains and study of various legal and ethical issues related to electronic transactions, intellectual property rights and its importance.

- To understand how to implement security for Ecommerce and the basic concepts of electronic transactions.

- To study about Business to Business E-commerce and usage of electronic Data Interchange (EDI) in detail.

Syllabus:

UNIT - I **Electronic Commerce:** Overview of Electronic Commerce, Scope of Electronic Commerce, Traditional Commerce vs. Electronic Commerce, Impact of E-Commerce, Electronic Markets, Internet Commerce, e-commerce in perspective, Application of E Commerce in Direct Marketing and Selling, Obstacles in adopting E-Commerce Applications; Future of E-Commerce.

UNIT - II Value Chains in electronic Commerce, Supply chain, Porter's value chain Model, Inter Organizational value chains, Strategic Business unit chains, Industry value chains.

Security Threats to E-commerce: Security Overview, Computer Security Classification, Copyright and Intellectual Property, security Policy and

Integrated Security, Intellectual Property Threats, electronic Commerce Threats, Clients Threats, Communication Channel Threats, server Threats.

UNIT - III **Implementing security for E-Commerce:** Protecting E- Commerce Assets, Protecting Intellectual Property, Protecting Client Computers, Protecting E-commerce Channels, Insuring Transaction Integrity, Protecting the Commerce Server.

Electronic Payment System: Electronic Cash, Electronic Wallets, Smart Card, Credit and Change Card.

UNIT - IV **Business to Business E-Commerce:** Inter-organizational Transitions, Credit Transaction Trade Cycle, a variety of transactions. Electronic Data Interchange (EDI): Introduction to EDI, Benefits of EDI, EDI Technology, EDI standards, EDI Communication, EDI Implementation, EDI agreement, EDI security.

COURSE OUTCOMES: Students will be able to:
- Understand various concepts of electronic commerce.
- Study of Electronic market and various types of business models.
- Study of various business strategies and marketing strategies.
- Know about various Electronic Payment Systems.
- Understand about various security threats to Ecommerce and how to implement security for it.
- Learn about Electronic Data Interchange in detail.

Text Books/ Reference Books:

1. R.Kalakota and A.B.Whinston,Readings in Electronic Commerce, Addison Wesley.

2. David Kosiur, Understanding E- Commerce, Microsoft Press, 1997.

3. Soka, From EDI to Electronic Commerce , McGraw Hill, 1995.

4. David whitely, E-commerce Strategy, Technology and application, Tata McGraw Hill.

5. Gary P. Schneider and Jame Perry, Electronic Commerce Thomson Publication.

6. Doing Business on the Internet E-COMMERCE S. Jaiswal;Galgotia Publications.

7. E-Commerce An Indian Perspective; P.T.Joseph; S.J.; PHI.

8. E-Commerce; Efrain Turbon; Jae Lee; David King; H.Michael Chang.

BCA-17-208: Object Oriented Programming Using C++
BCA IV Semester

No. of Credits: 5	Sessional: 25 Marks
L T P Total	Theory : 75 Marks
5 0 0 5	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To understand difference between object oriented programming and procedural programming.
- To learn basic concept and syntax of the C++.
- To implement C++ classes using encapsulation and design principles.
- To implement program using more advanced C++ features such as composition of objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, templates etc.

Syllabus:

UNIT-I Object Oriented Programming Concepts: Procedural Language and Object Oriented approach, Characteristics of OOP, user defined types, polymorphism and encapsulation. Getting started with C++: syntax, data types, variables, string, function, namespace and exception, operators, flow control, recursion, arrayand pointer, structure.

UNIT-II Abstracting Mechanism: classes, private and public, Constructorand Destructor, member function, static members, references;
Memory Management: new, delete, object copying, copyconstructer, assignment operator, this input/output

UNIT-III Inheritance and Polymorphism: Derived Class and Base Class, Different types of Inheritance, Overriding member function, Abstract Class, Public and Private Inheritance, Ambiguity in Multiple inheritance, Virtual function,

Friend function, Static function.

UNIT-IV **Exception Handling:** Exception and derived class, function exception declaration, unexpected exception, and exception when handling exception, resource capture and release.

Template and Standard Template Library: Template classes, declaration, template functions, namespace, string, iterators, hashes, iostreams and other types.

Course Outcomes

The student will be able to:
- Understand difference between object-oriented programming and procedural programming.
- Learn basic concept and syntax of the C++.
- Implement C++ classes using encapsulation and design principles.

- Implement program using more advanced C++ features such as composition of objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, templates etc.

Text Books/ Reference Books:

1. E Balagurusamy: Programming in Java.

2. Herbert Schildt: The Complete Reference JAVA, TMH Publication.

3. Begining JAVA, Ivor Horton, WROX Public.

4. Stephen Potts: JAVA 2 UNLEASHED, Tech Media Publications.

5. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference",1999,TMH

No. of Credits: 5	Sessional:	25 Marks
L T P Total	Theory :	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

- To enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.

- To make the students understand project management concepts & their metrics.

- To make the students understand requirement engineering and its models (Information, functional, behavioral).

- Making the students understand to develop quality software, its maintenance & introduce about software reliability.

Syllabus:

UNIT – I Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models.

Software Requirements Analysis & Specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS .

UNIT – II Software Project Management Concepts: The Management spectrum, The People, The Problem, The Process, The Project.

Software Project Planning: Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, RiskManagement.

UNIT – III Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics

Software Implementation: Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style.

UNIT – IV Software Testing: Testing Process, Design of Test Cases, Types of Testing, Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing, Debugging Activities.

Software Maintenance: Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re- engineering, Configuration Management, Documentation.

Course Outcomes:

The student will be able to

- Implement Software life cycle models and have a knowledge of different phases of Software life cycle.
- Identify, formulate, review, estimate and schedule complex software projects using principles of mathematics.
- Create a bug free software with good design and quality by using appropriate techniques and modern engineering and IT tools.
- Analyze verification, validation activities, static, dynamic testing, debugging tools and techniques and importance of working in teams.

Text Books/ Reference Books:

1. Pressman : Software Engineering, TMH.
2. K.K Aggarwal & Yogesh Singh: Software Engineering, New Age International Publishers.
3. Jalote, Pankaj : An Integrated Approach to Software Engineering, Narosa Publications.
4. Ghezzi, Carlo : Fundaments of Software Engineering, PHI.
5. Fairely, R.E. : Software Engineering Concepts, McGraw-Hill.
6. Lewis, T.G.: Software Egineering, McGraw-Hill.
7. Shere : Software Engineering & Management, Prentice Hall.

BCA-17-210: HTML AND C++ LANGUAGE LAB
BCA IV Semester

No. of Credits: 3   Sessional: 30 Marks
L T   P   Total   Theory :   70 Marks
 0 0   6   6   Total :   100 Marks
                                            Duration of Exam: 3 Hours

List of Programs:

HTML Lab

1. Introduction to HTML

2. Write a program to print a simple message in HTML.

3. Write a program to formatting tags like heading tags, font style, color tags.

4. Write a program to create hyperlinks in HTML.

5. Write a program to create various types of list.

6. Write a program to create chess board and time table using table tag.

7. Write a program to create frames.

8. Write a program to use various tags in HTML.

9. Write a program to use CSS in HTML.

10. Program to create a webpage using HTML.

C++ Language Lab

1. Write a program to print a message in C++.

2. Write a program to implement the concept of Structures.

3. Write a program to create a class.

4. Write a program to create various constructors and destructors of a class.

5. Write a program to implement the concept of various inheritance techniques in class.

6. Write a program to create friend function and friend class.

7. Write a program to implement the concept of exception handling in C++.

8. Write a program to create Templates.

9. Write a program to implement the concept of polymorphism.

10. Write a program to implement the concept of virtual function.

BCA-17-301: OBJECT TECHNOLOGIES & PROGRAMMING USINGJAVA
BCA V Semester

No. of Credits: 5	Sessional: 25 Marks
L T P Total	Theory : 75 Marks
5 0 0 5	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To Study the software and hardware requirement and installing the java.
- To understand Java programming constructs like variable, primitive data types, operators, type conversion, type casting etc.
- To develop program by using classes, object, nested classes, constructors etc.
- To create package, use of packages, adding a class to a package.
- To understand conversion of numbers and Strings, manipulations of strings.
- To implement inheritance of classes, polymorphism, abstract class.
- To create file, deleting file, copying the content in files, reading and Writing in files.
- To handle the checked and unchecked exception,

Syllabus:

    UNIT - I **Object Oriented Methodology-1:** Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs .

    Object Oriented Methodology-2: Classes and Objects, Abstraction and Encapsulation, Inheritance, Method Overriding and Polymorphism.

    UNIT - II **Java Language Basics***:* Introduction to Java, Basic Features, Java Virtual Machine Concepts, Primitive Data Type and Variables, Java Operators, Expressions, Statements and Arrays.

    Object Oriented Concepts: Class and Objects-- Class Fundamentals, Creating objects , Assigning object reference variables; Introducing Methods,

Static methods, Constructors ,Overloading constructors; This Keyword; Using Objects as Parameters, Argument passing, Returning objects , Method overloading, Garbage Collection, The Finalize ( ) Method.

Inheritance and Polymorphism: Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword.

UNIT - III **Packages:** Defining Package, CLASSPATH, Package naming, Accessibility of Packages, using Package Members.

Interfaces: Implementing Interfaces, Interface and AbstractClasses, Extends and Implements together.

Exceptions Handling: Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing ExceptionSubclasses.

UNIT - IV **Multithreading:** Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Inter thread Communication.

I/O in Java : I/O Basics, Streams and Stream Classes ,The Predefined Streams, Reading from, and Writing to, Console, Reading and Writing Files , The Transient and Volatile Modifiers
, Using Instance of Native Methods.

Strings and characters: Fundamentals of Characters and Strings, the String Class, String Operations, Data Conversion using Value Of ( ) Methods, String Buffer Class and Methods.

Course Outcomes:
After the course completion the students will be:

- Understand the differentiate between various programming paradigms available and familiar with the basic concept of the Java
- Implement the classes using proper syntax and applying the various features of the language.
- Implement abstract classes , polymorphism, inheritance and File handling to solve the complex problem
- Implement the concepts of java programming like multithreading packages and the exceptions

handling.

- Apply the object- oriented concepts to the real world problems

Text Books/ Reference Books:

1. E Balagurusamy: Programming in Java.

2. Herbert Schildt: The Complete Reference JAVA, TMH Publication.

3. Begining JAVA, Ivor Horton, WROX Public.

4. Stephen Potts: JAVA 2 UNLEASHED, Tech Media Publications.

5. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference",1999,TMH.

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-302 COMPUTER GRAPHICS
BCA V Semester

No. of Credits: 5
L T   P   Total
 5 0   0   5

Sessional: 25 Marks
Theory :   75 Marks
Total :   100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

1. To analyze where to apply computer graphics.

2. To analyze different display systems and their techniques.

3. To design the algorithms for generating geometric shapes.

4. To design and analyze the 2D&3D geometric transformations and viewing.

5. To design the clipping.

Syllabus:

UNIT - I   **Graphics Primitives:** Introduction to computer graphics, Basics of Graphics systems, Application areas of Computer Graphics, overview of graphics systems, video-display devices, and raster- scan systems, random scan systems, graphics monitors and workstations and input devices.

Output Primitives: Points and lines, line drawing algorithms,mid-point circle and ellipse algorithms. Filled area primitives:Scan line polygon fill algorithm, boundary fill and flood-fill algorithms.

UNIT - II **2-D Geometrical Transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT - III **3-D Object Representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline, curves, Bezier and B-Spline surfaces. Basic illumination models,polygon-rendering methods.

UNIT - IV **3-D Geometric Transformations:** Translation, rotation, scaling,reflection and shear transformations, composite transformations.

3-D Viewing: Viewing pipeline, viewing coordinates, viewvolume and general projection transforms and clipping.

Course Outcomes:

On completing this course students will

- Have the clear idea regarding the applications of the computer graphics.
- Design algorithms for different geometric shapes line, circle, ellipse...etc.
- Perform scan line polygon filling, boundary filling.
- Perform transformations (rotation, scaling, translation,shearing) on geometric objects.
- Perform line clipping and polygon clipping by different techniques against viewing window.
- Perform different types of projection on different objects

Text Books/ Reference Books:

1. Donald Hearn and M. Pauline Baker: Computer Graphics, PHI Publications.
2. Plastock : Theory & Problem of Computer Gaphics, Schaum Series.
3. Foley & Van Dam: Fundamentals of Interactive Computer Graphics, Addison- Wesley.
4. Newman: Principles of Interactive Computer Graphics, McGraw Hill.
5. Tosijasu, L.K.: Computer Graphics, Springer-Verleg.

BCA-17-303 DATA COMMUNICATION AND NETWORKING
BCA V Semester

No. of Credits: 5
L T   P   Total
 5 0   0   5

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives
- To understand basic computer network technology, Data Communications System and its components, different types of network topologies and protocols.
- To understand the layers of the OSI model and TCP/IP, function(s) of each layer and to identify the different types of network devices and their functions within a network.
- To know basic protocols of data link layer, how they can be used to assist in network design and implementation, IEEE standards for LAN and MAN.
- To analyze the features and operations of network layer, application layer protocols including various switching mechanism

Syllabus:

UNIT - I **Introduction to Computer Communications and Networking Technologies:** Uses of Computer Networks; Network Devices, Nodes, and Hosts; Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; Network Applications and Application Protocols; Computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server Model, Peer-to-Peer Model, Web-Based Model, Network Architecture and the OSI Reference Model, TCP/IP reference model, Example Networks: The Internet, X.25, Frame Relay, ATM.

UNIT - II **Analog and Digital Communications Concepts:** Concept of data, signal, channel, bid-rate , maximum data-rate of channel, Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Asynchronous and synchronous transmission, data encoding techniques, Modulation techniques, Digital Carrier Systems;Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Dialup Networking; Analog Modem Concepts; DSL Service.

UNIT - III **Data Link Layer:** Framing, Flow Control, Error Control: Error Detection and Correction; Sliding Window Protocols; Media Access Control: Random Access Protocols, Token Passing Protocols; Token Ring; Introduction to LAN technologies: Ethernet, switched Ethernet, VLAN, fast Ethernet, gigabit Ethernet, token ring, FDDI, Wireless LANs; Bluetooth; Network Hardware Components: Connectors, Transceivers, Repeaters,Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways.

UNIT - IV **Network Layer and Routing Concepts:** Virtual Circuits and Datagrams; Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, HierarchicalRouting; Congestion Control Algorithms; Internetworking; **Network Security Issues:** Security threats; Encryption Methods;Authentication ,Symmetric Key Algorithms; Public-KeyAlgorithms.

Course Outcomes

At the end of program the student acquire knowledge about

- Acquire knowledge about basic computer network technology, Data Communications System and its components, different types of network topologies and protocols.
- Understand the layers of the OSI model and TCP/IP, function(s) of each layer and identify the different types of network devices and their functions within a network.

- Apply protocols of data link layer in network design and implementation, IEEE standards for LAN and MAN.
- Analyze the features and operations of various network layers, application layer protocols including various switching mechanism

Text Books/ Reference Books:

1. Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", CENGAGE Learning.
2. Andrew S. Tanenbaum, "Computer Networks", Pearson Education.
3. James F. Kurose, Keith W. Ross, "Computer Networking", Pearson Education
4. Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill

BCA-17-304 VB.NET
BCA V Semester

No. of Credits: 5   Sessional: 25 Marks
L T   P   Total   Theory :   75 Marks
5 0   0   5   Total :   100 Marks
                                         Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

- To study the features of .Net Technologies & to understand Visual Studio .Net Environment
- To learn of C# programming fundamentals
- To learn VB.Net programming constructs
- To learn ADO.Net Object Model.

Syllabus:

UNIT - I **Introduction to .Net Framework:** Introduction to .NET: The origin of .NET, Basics of .Net Framework & its Key design goals,3-tier architecture, managed code, assemblies, CLR, Execution of assemblies code, IL, JIT, .NET framework class library, common type system, common language specification, metadata; Interoperability with unmanaged code.

       Net Framework Base Classes: System Namespaces; the System Types; System.object class; System. Exception Class; System. Collections.

UNIT - II **Understanding the Development Environment: .NET Integrated Development Environment** : Projects & Solutions, User Interface Elements, The Visual Studio Start Page; Visual Studio.Net work area; Navigational Features, Understanding Window Forms; Viewing and changing properties; Addingcontrols to the form.

       Designing Visual Components: Using the task list.

UNIT - III **Introduction to VB .Net**: Data Types, Operators, Methods, Handling Strings, Jagged Array, Array list, Indexer (one Dimension) and property, Interfaces, Constructors, Destructors.

User Interface: Procedures in VB.NET, Garbage Collection,Message boxes; Dialog boxes; Menus and Toolbars.

UNIT - IV **Working with Database:** Architecture of ADO.Net, Comparison with ADO, ADO.Net Object Model, Net Data provider, Data Adapter, Data Set, Data Row, Data Column, Data Relation, command, Data Reader, Connecting to Database, Accessing & Manipulating Data and Performing Data Updates.

Course Outcomes:

- Understand .net framework , its runtime environment and application development using IDE of Visual Studio 2010 and higher versions.
- Implement VB.Net language constructs in the form of stand-alone console and Window form applications .
- Understand Database concepts in ADO.net and apply the knowledge to implement distributed data-driven applications.
- Design, document, debug forms with validation controls and implement using VB.Net, SQL-Server and ADO.Net

Text Books/ Reference Books:

1. Jeffrey Richter, Francesco Balena : Applied .Net Framework.

2. Prog. In MS VB. Net, TMH Publications.

3. Michael Halvorsan : Microsoft Visual Basic.NET step by step,PHI Publication.

4. Rebecca M.Riordan: Microsoft ADO.NET Step By Step , PHI Publication.

BCA-17-305: JAVA & VB.NET LAB
BCA V Semester

No. of Credits: 3
L T   P   Total
 0 0   6   6

Sessional: 30 Marks
Practical: 70 Marks
Total :   100 Marks
Duration of Exam: 3 Hours

List of Experiments:

Java Lab

1. Write a Java program that prints all real solutions to the quadratic equation
    $ax2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the
    discriminant $b2 - 4ac$ is negative, display a message stating that there are no
    real solutions.

2. Write a Java program that prompts the user for an integer and then prints
    out allprime numbers up to that integer.

3. Write a Java program to multiply two given matrices.

4. Write a Java Program that reads a line of integers, and then displays each
    integer,and the sum of all the integers(Use StringTokenizer class of java.util)

5. Write a Java program that checks whether a given string is a palindrome or
    not.Ex: MADAM is a palindrome.

6. Write a Java program for sorting a given list of names in ascending order.

7. Write a Java program to make frequency count of words in a given text.

8. Write a Java program that reads a file name from the user, then displays
    information about whether the file exists,whether the file is readable, whether
    the file is writable,the type of file and the length of the file in bytes.

9. Write a Java program that reads a file and displays the file on the screen,
    with aline number before each line.

10. Write a Java program that displays the number of characters, lines and words in a
    textfile.

11. Develop an applet that displays a simple message.

12. Write a Java program that works as a simple calculator. Use a grid layout
    to arrange buttons for the digits and for the+, -,*, % operations. Add a text
    field todisplay the result.

13. Write a Java program for handling mouse events.

14. Develop an applet that receives an integer in one text field, and computes its factorialValue and returns it in another text field, when the button named "Compute" is clicked.

VB.NET Lab

1. Program to create and validate login form.
2. Program to implement inheritance.
3. Program to implement the concept of polymorphism.
4. Program to create an interface in VB.NET.
5. Program to use Advance Controls.
6. Program to implement various properties in VB.NET.
7. Program to use common dialogue controls in VB.NET.
8. Program to create menus n toolbars in VB.NET.
9. Program to show record from database using data grid control.
10. Program to insert, delete, update, search record from database.

BCA -17-306: MOBILE APPLICATION DEVELOPMENT
BCA VI Semester

No. of Credits: 5
L T   P   Total
5 0   0   5

Sessional: 25 Marks
Theory :   75 Marks
Total :   100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objective:

- To understand the components and structure of mobile application development frameworks
  for Android.
- To understand how to work with various mobile application development frameworks.
- To learn the basic and important design concepts and issues of development of mobile applications.
- To understand the capabilities and limitations of mobile devices.
- To develop a software with reasonable complexity on mobile platform.
- To introduce Android platform and its architecture.
- To learn activity creation and Android UI designing.
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To work with SQLite Database and content providers.
- To integrate multimedia, camera and Location based services in Android Application.
- To explore Mobile security issues.

Syllabus:

UNIT – I What is Android?, Setting up development environment, Dalvik Virtual Machine & .apk file extension, Fundamentals: Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication - Intents & Intent Filters, Android API levels (versions & version names), Application Structure (in detail), AndroidManifest.xml, uses-permission & uses-sdk,Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle.

UNIT – II Emulator-Android Virtual Device, Launching emulator, Editing emulator settings, Emulator shortcuts, Logcat usage, Introduction to DDMS, Second App:- (switching between activities) , Develop an app for demonstrating the communication between Intents, Basic UI design, Form widgets, Text Fields, Layouts, [dip, dp, sip,sp] versus px.

UNIT – III Preferences, Shared Preferences, Preferences from xml, Examples, Menu, Option menu, Context menu, Sub menu, menu from xml, menu via code, Examples, Intents (in detail), Explicit Intents, Implicit intents, Examples, Content Providers. SQLite Programming, Introduction to SQL DML & DDL Queries in brief. SQLiteOpenHelper, SQLiteDatabse, Cursor, Reading and updating Contacts, Reading bookmarks, Example: Develop an App to demonstrate database usage.

UNIT – IV Adapters:- ArrayAdapters, BaseAdapters, ListView and ListActivity, Custom listview, GridView using adapters, Gallery using adapters, Broadcast Receivers, Services and notifications, Toast, Alarms, Examples, Threads,Threads running on UI thread (runOnUiThread),Worker thread,Handlers & Runnable, AsynTask(in detail), Examples.

Course Outcomes:
At the end of this course the student will:
- Know the tasks, tools and techniques accompanying the development process of mobile applications.
- Be able to apply general programming knowledge in the field of developing mobile applications.
- Understand the interaction between user interface and underlying application infrastructure.
- Describe Android platform, Architecture and features.
- Design User Interface and develop activity for Android App.
- Use Intent , Broadcast receivers and Internet services in Android App.
- Design and implement Database Application and Content providers.
- Use multimedia, camera and Location based services in Android App.
- Discuss various security issues in Android platform

Text Books/ Reference Books:

1. https://developer.android.com/training/index.html
2. Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) by Bill Philips & Brian Hardy.
3. Android Design Patterns: Interaction Design Solutions for Developers by Greg Nudelman.
4. Programming Android by Zigurd Mednieks, Laird Dornin, G. Blake Meike & Masumi Nakamura.

BCA-17-307: SOFTWARE TESTING
BCA V Semester

No. of Credits: 5	Sessional:	25 Marks
L T P Total	Theory :	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

- To get familiar the students about basic concepts of software testing and its techniques.
- To study the concepts of Verification and validation activities.
- To study in detail the process of performing the black box and white box testing approaches with examples.
- To get familiar the students the concept of regression testing.
- To study about the various testing automation and debugging tools and case studies.
- To study the basic and advanced concepts of object oriented testing.

Syllabus:

UNIT - I **Testing terminology and Methodology**: Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing, Importance of Testing, Definition of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test strategy, verification, validation,

Verification and validation: Verification activities, verification of requirements, verification of HL design, verification of data design, verification of architectural design, verification of UI design, verification of LL design, introduction to validation activities.

UNIT – II **Dynamic testing: White Box testing:** Boundary value analysis, equivalence class portioning, state table based testing, decision table based, error guessing.

Black Box Testing: Logic coverage criteria, basic path testing, graph matrices.

UNIT - III **Validation Testing:** Unit testing, drivers , stubs, integration testing, methods, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing.

Regression Testing: Objective of regression testing, Regression test process, Regression testing techniques.

Static testing: Inspection ,Review and Walkthrough, dynamic testing, testing life cycle model, testing techniques, testing principles, Testing Metrices.

UNIT – IV **Test Automation and debugging:** S/w measurement and testing, testing metrics and tools Case Study: Testing for Object-oriented and web-based systems.

Object-Oriented Testing: Use-case based testing; Class testing, Testing Exception handling.

Course Outcomes:
After the completion of the course The student will be able to

- Design and develop bug free software systems using concepts of software testing.

- Identify, formulate, review and analyze complex engineering problems of testing using principles of mathematics.

- Create, select and apply appropriate techniques and modern engineering and IT tools for software testing.

- Analyze verification, validation activities, static, dynamic testing, debugging tools and techniques and importance of working in teams.

Text Books/ Reference Books:

1. G.J Myers, The Art of Software Testing, John Wiley & Sons, 1979.

2. Naresh Chauhan, Software Testing Principles and Practices,OXFORD University Press.

Note: Latest and additional good books may be suggested and added from time to time.

BCA-17-308 ARTIFICIAL INTELLIGENCE
BCA VI Semester

No. of Credits: 5
L T   P   Total
5 0   0   5

Sessional: 25 Marks
Theory :   75 Marks
Total :   100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:
- To understand achievements of AI and the theory underlying those achievements.
- To review "conventional" searching methods including breadth-first, depth-first, best-first search any many more heuristic techniques. Heuristic functions and their effect on performance of search algorithms.
- To represent the knowledge in different forms as well as an understanding of other topics such as   minimax, resolution, etc.
- To understand the use of fuzzy logic and temporal reasoning.
- To learn the different methods of Planning and Learning

Syllabus:

UNIT - I **Overview of A.I:** Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success.

Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem.

Heuristic search techniques : Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction

UNIT - II **Knowledge Representation**: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation.

Using Predicate Logic: Represent ting Simple Facts in logic, representing instances and is-a relationship, Computable function andpredicate.

UNIT - III **Natural language processing:** Introduction syntactic processing, Semantic processing, Discourse and pragmatic processing.

Learning: Introduction learning, Rote learning, learning by taking advice,learning in problem solving, learning from example-induction,Explanation based learning.

UNIT - IV **Expert System:** Introduction, Representing using domain specificknowledge, Expert system shells.

Course Outcomes:

After undergoing the course, Students will be able to:
- Understand the importance, the basic concepts and the Applications of AI.
- Apply various search techniques used for Intelligent systems
- Efficiently represent the various knowledge representation schemes used for intelligent systems.
- Understand the phases and the architecture of various advanced system like NLP based system and Expert System.

Text Books/ Reference Books:

1. Elaine Rich, Kevin Knight: Artificial Intelligence, Tata McGraw Hill.

2. David W. Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill Book Company.

3. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1999.

4. Nils J Nilsson, "Artificial Intelligence -A new Synthesis" 2nd Edition (2000), Harcourt Asia Ltd.

BCA-17-309: MAJOR PROJECT
BCA VI Semester

No. of Credits: 4
L T   P   Total
0 0   6   6

Sessional: 30 Marks
Theory :   70 Marks
Total :   100 Marks
Duration of Exam: 3 Hours

No. of Credits: 3

L T   P   Total

0 0   6   6

Sessional: 30 Marks

Practical: 70 Marks

Total :   100 Marks

Duration of Exam: 3 Hours

List of Experiments:

MAD Lab

1. Develop an application that uses GUI components, Font and Colors.

2. Develop an application that uses Basic UI design, Form widgets.

3. Develop an application that uses Layout Managers and event listeners.

4. Develop a native calculator application.

5. Develop an application that draws basic graphical primitives on the screen.

6. Develop an application that makes use of database.

7. Develop an app for demonstrating the communication between Intents.

AI Lab

8. Program to implement member, subset, factorial, Count the number of Occurrence, append, delete an element.

9. To Find Reverse of a list.

10. To find factorial of a number.

11. Write a program to print Fibonacci series.

12. To implement Relation using Prolog.

13. A Program to find the distance using roadmap.

14. To sort the list using Merge Sort.

15. To implement quick sort using recursion.

16. Write a Program to show union and Intersection of two lists.

17. Write a program to concatenate two strings of different lengths.

18. A Program to find whether two lists are equal or not if they are in same or different order.

19. A program to replace one element with another in a list.

20. A Program to implement selection sort.

21. A Program to sort a list using insertion sort algorithm.

22. A Program to find whether a string is palindrome or not.

GEC-2 CYBER LAWS AND SECURITY

No. of Credits: 3
L T   P   Total
5 0   0   5

Sessional: 25 Marks
Theory :   75 Marks
Total :   100 Marks
Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

The objective of the course is

- To make students familiar about security, its related terms like threat, attack, control etc.
- To introduce various security challenges in different application domains
- To introduce security threats in the internet based applications.
- To make students familiar with various physical security methods
- To make students familiar about various forensic tools and various laws for cyber crime and policy designed by the government for cyber security.

Syllabus:

UNIT - I History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

UNIT - II Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control-Biometrics, Factors in Biometrics

Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects,Legal Challenges.

UNIT – III Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network Security- Basic Concepts, 89 Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

UNIT – IV Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mIningSecurity, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes.

Course Outcome:

By the end of the course, students should be able :
- To understand the concept of security and its differentiation with its related terms.
- To understand why security is important for internet based applications and various security threats in these areas.
- To understand various methods to provide physical security.
- To know laws, policies initiated by the government against cyber crime.

Text Books/ Reference Books:

1. Godbole," Information Systems Security", Willey

2. Merkov, Breithaupt, " Information Security", Pearson Education

3. Yadav, "Foundations of Information Technology", New Age, Delhi

4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill

5. Sood,"Cyber Laws Simplified", Mc Graw Hill

6. Furnell, "Computer Insecurity", Springer 7. IT Act 2000

GEC-3 SOFT COMPUTING

No. of Credits: 3	Sessional:	25 Marks
L T P Total	Theory :	75 Marks
5 0 0 5	Total :	100 Marks
	Duration of Exam:	3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives
To subject aims to educate the students about
- To acquaint the students with the need for soft computing and its associated tools.
- To understand about the concepts relating to fuzzy sets and logic and their applications in various domains.
- To learn the concepts relating to Neural Networks and their applications in the areas of classification and content addressable memory.
- To acquaint the students with the need for Genetic Algorithms and their utility in solving the problems having huge state space.
- To understand, how to use various soft computing tools in solving practical problems.

Syllabus:

UNIT - I **Neural Networks:** History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

UNIT - II **Fuzzy Logic:** Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.
Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

UNIT – III **Fuzzy Arithmetic:** Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

UNIT - IV **Fuzzy Logic:** Classical Logic, Multivalued Logics, Fuzzy Propositions,Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Genetic Algorithms: Scope & application areas, solution of 0-1Knapsack problem using GA.

Course Outcomes
After the completion of the course, the students will be able to:
- The students will be able to understand and apply basic concepts related to fuzzy sets and logic.
- The students will be able to understand and apply basic concepts related to neural networks.
- The students will be able to understand and apply basic concepts related to Genetic Algorithms.
- The students will be able to apply concepts related to Genetic Algorithms, Neural Networks and Fuzzy Logic to practical problems.

Text Books/ Reference Books:
1. "Fuzzy sets and Fuzzy Logic: Theory and applications",G.J. Klir,B.Yuan, PHI
2. "Introduction to Fuzzy sets and Fuzzy Logic", M.Ganesh , PHI
3. "An Introduction to Fuzzy Control", D Driankov, H Hellendoorn, M Reinfrank, Narosa Publishing Company
4. " Neural Networks: A classroom approach", Satish Kumar , Tata McGraw Hill
5. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
6. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999

GEC-4 WEB TECHNOLOGY AND INFORMATION RETRIEVAL

No. of Credits: 3   Sessional: 25 Marks
L T   P   Total   Theory :   75 Marks
5 0   0   5   Total :   100 Marks
                                      Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Objectives:

- To build an understanding of the fundamental concepts of Information Retrieval.

- To understand the elements of Web Search Engines and Crawlers.

- To familiarize students with the basic taxonomy and terminology of Indices and to understand Heap's Law for estimation and Zipf's law for modeling distribution of terms

- To understand dictionary compression and posting list compression and to introduce the scoring, tf-idf weighting and vector space model for scoring

Syllabus:

UNIT - I **Web Server Technology:** Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secure HTTP, Secure Sockets Layer, WWW Proxies, IIS, Case study of apache web server.

UNIT - II **Web Search Basics:** Background and history, Anatomy of WWW, Web characteristics, Spam, The web graph, The Web Search Users, search engines, architecture of search engines, search tools, DNS resolution, The URL frontier, Link analysis, PageRank.
   Web Crawlers: Basics of Web crawling, Various crawling techniques, incremental crawler, parallel crawler, distributed crawlers, focused crawler, agent based crawler, Hidden web Crawler.

UNIT – III **Introduction to Information Retrieval:** Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes.

UNIT - IV **Index construction:** Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes Index compression: Statistical properties of 93 terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

Course Outcome:

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

- Understand basic Information Retrieval Systems and learn how Boolean queries are processed.

- Understand the basic concept of Search Engines their architecture and its various functional components and understand the basic concept of Web crawlers and their architecture.

- Identify the different types of indices: inverted index, positional index, biword index and be able make estimations and model distribution of terms and compressions.

- Enumerate various types of indices and also understand the concept of efficient storage of indices and learn tf-idf scoring and vector space model scoring for ranking.

GEC-5 INTELLECTUAL PROPERTY AND RIGHTS

No. of Credits: 3	Sessional: 25 Marks
L T P Total	Theory : 75 Marks
5 0 0 5	Total : 100 Marks
	Duration of Exam: 3 Hours

Note: Examiner will be required to set *Seven* questions in all having two parts. Part I will have Question Number 1 consisting of total 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be *Six* questions. Examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions from Part II.

Course Outcome:

- To make the student aware about Intellectual Property and why it is important

- To study the concept of Patents, history of patent and its categorization.

- To learn the procedure of obtaining Patents.

- To make the student learn Assignment and Revocation of Patent

- To study the concept of infringement and its defence

Syllabus:

UNIT - I **Introduction to Intellectual Property:** Concept of Intellectual Property, Kinds of Intellectual Property, Economic Importance of Intellectual Property.

Indian Theory on Private Property: Constitutional Aspects of Property, Constitutional Protection of Property and Intellectual Property, Economic Development and Intellectual Property Rights Protection.

UNIT - II **Introduction to Patents:** Overview, Historical Development, Concepts: Novelty, Utility.

Patentable Subject-matter: Patent Act, 1970- Amendments of 1999,2000, 2002 and 2005, Pharmaceutical Products and Process and Patent , Protection, Software Patents, Business Method, Protection of Plant Varieties and Farmers' Rights Act, 2001, Patenting of Micro-organism.

UNIT – III **Procedure of Obtaining of Patents:** Concepts of a Patent Application,, Specification: Provisional, Complete, Disclosure Aspects, Claims: Principal, Dependant, Omnibus, Examination of Application, Opposition of Application, Sealing of Patents.

Working of Patents: Compulsory License: Commercialization of Inventions: License- Terms of License Agreement, Assignments of Patents, Revocation of Patents.

UNIT - IV Infringement: What is Infringement?, How is Infringement determined? Who is an Infringer?Direct, Contributory and Induced, Defences of Infringement: 5.2.1 Research Exemption, Invalidity, Misuse, Failure to mark, Laches and Estoppel and first sale doctrine.

Course Outcome:

After completion of the course student will be able to:

- Understand the concept of Intellectual Property and its importance.

- Understand Patents, categorization and procedure for obtaining patents.

- Understand the commercialization of invention

- Understand the concept of infringement and its defence

Text Books/ Reference Books:
1. W.R. Cornish, Intellectual Property, Sweet & Maxwell, London (2000)
2. P. Narayana, Patent Law, Wadhwa Publication
3. Merges, Patent Law and Policy: Cases and Materials, 1996
4. Brian C. Reid, A Practical Guide to Patent Law, 2nd Edition, 1993
5. Brinkhof (Edited), Patent Cases, Wolters Kluwer.
6. Prof. Willem Hoyng & Frank Eijsvogels, Global Patent Litigation, Strategy and Practice, Wolters Kluwer.
7. Gregory Stobbs, Software Patents Worldwide, Wolters Kluwer.
8. Feroz Ali Khader, The Law of Patents- With a special focus on Pharmaceuticals in India, Lexis Nexis Butterworths Wadhwa, Nagpur.
9. Sookman, Computer Law, 1996
10. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009). Eastern Book Company, Lucknow.